

## A CLINICAL STUDY ON ILEAL PERFORATION

G. Kishore Babu<sup>1</sup>, K. Lokesh<sup>2</sup>

<sup>1</sup>Associate Professor, Department of General Surgery, SVMC, Tirupathi.

<sup>2</sup>Post Graduate, Department of General Surgery, SVMC, Tirupathi.

---

### ABSTRACT

---

#### INTRODUCTION

Ileal perforation is a common problem seen in tropical countries, the commonest cause being typhoid fever. In western countries the causes are malignancy, trauma and mechanical aetiology, in the order of frequency.<sup>1,2,3</sup> Over the years a definite changing trend has been observed in ileal perforations both in terms of causes, treatment and prognosis. Better antibiotics, aggressive surgery and the elimination of conservative treatment, better preoperative and postoperative care have all significantly contributed to the improvement in patient outcome.<sup>4,5</sup> But still cases of ileal perforation cause a significant morbidity and mortality that persists despite the significant changes in health care over the years.

#### AIMS AND OBJECTIVES

To study the aetiology, presentation, management outcome and the factors influencing prognosis and outcome in ileal perforations.

#### MATERIAL & METHODS

##### Study Setting

S. V. Medical College, Department of General Surgery, Tirupathi.

##### Study Period

Patients attending S. V. Medical College, Department of General Surgery with perforation during the period from November 2012 to October 2015.

##### Inclusion Criteria

Patients between age group of more than 14 years presenting with pain abdomen and who are diagnosed to have ileal perforation in the intra operative period are selected.

##### Exclusion Criteria

Patients with peritonitis due to other causes like gastric, duodenum or large bowel perforation are excluded.

##### Study Method

The present study is a prospective study done on 28 patients of ileal perforation due to typhoid complication, nonspecific and traumatic perforations. History, clinical examination, investigations, operative findings, post-operative complications were recorded. In patients with non-traumatic perforations Widal test was done.

#### CONCLUSION

Typhoid fever and traumatic aetiology are the most common cause of Ileal perforation, followed by TB. Patients are more of male gender and are in reproductive age group. Widal serology is a useful test in the diagnosis of typhoid fever; histopathology is useful in the diagnosis of tubercular perforations. Ileal perforations have a higher morbidity rate. Traumatic perforations have a good outcome than other causes.

#### KEYWORDS

Ileal perforation, Typhoid fever, Traumatic perforation, Ileostomy.

---

**HOW TO CITE THIS ARTICLE:** Babu GK, Lokesh K. A clinical study on ileal perforation. J. Evid. Based Med. Healthc. 2016; 3(21), 876-881. DOI: 10.18410/jebmh/2016/199

---

---

*Submission 15-02-2016, Peer Review 02-03-2016,  
Acceptance 04-03-2016, Published 12-03-2016.*

*Corresponding Author:*

*Dr. G. Kishore Babu,  
#5-5-330, First Floor, Reservar Road,  
Tirupathi.*

*E-mail: dr.kishorebabu21@gmail.com*

*DOI: 10.18410/jebmh/2016/199*

---

**INTRODUCTION:** Ileal perforation is a common problem seen in tropical countries, the commonest cause being typhoid fever. In western countries the causes are malignancy, trauma and mechanical aetiology, in the order of frequency.<sup>1,2,3</sup> Over the years a definite changing trend has been observed in ileal perforations both in terms of causes, treatment and prognosis. Better antibiotics, aggressive surgery and the elimination of conservative

treatment, better preoperative and postoperative care have all significantly contributed to the improvement in patient outcome.<sup>4</sup> But still cases of ileal perforation cause a significant morbidity and mortality that persists despite the significant changes in health care over the years.

#### AIMS AND OBJECTIVES:

1. To study the clinical presentation and management of patients with ileal perforation.
2. To study the outcome of these patients and the factors influencing the outcome.

#### MATERIAL & METHODS:

**Study Setting:** S. V. Medical College, Department of General Surgery, Tirupati.

**Study Period:** Patients attending S. V. Medical College, Department of General Surgery with perforation during the period from November 2012 to October 2015.

**Inclusion Criteria:** Patients between age group of more than 14 years presenting with pain abdomen and who are diagnosed to have ileal perforation in the intra operative period are selected.

**Exclusion Criteria:** Patients with peritonitis due to other causes like gastric, duodenum or large bowel perforation are excluded.

**Study Method:** The present study is a prospective study done on 28 patients of ileal perforation due to typhoid complication, nonspecific and traumatic perforations. History, clinical examination, investigations, operative findings, post-operative complications were recorded. In patients with non-traumatic perforations Widal test was done.

All patients underwent laparotomy under general anaesthesia. Midline laparotomy was employed. The amount and type of peritoneal contamination, number, site and size of perforations and procedure employed were noted. The choice of procedure was based on laparotomy findings. The procedures done were simple primary closure, resection and anastomosis, end ileostomy and loop ileostomy, ileotransverse anastomosis.

**ILEAL PERFORATION INTRODUCTION:** The causes of ileal perforation are;

1. Typhoid.
2. Trauma.
3. Tuberculosis.
4. Mechanical Causes.
5. Malignancy.
6. Ischemic Enteritis.
7. Crohn's Disease.
8. Non Specific.
9. Perforation due to Diverticula.
10. Miscellaneous.

**Typhoid Perforation<sup>5,6,7,8,9</sup>:** The reported rate of bowel perforation in typhoid fever varies from 0.5% to 78.6%. There is a male preponderance in typhoid perforation. It predominantly occurs in younger age groups. It has been reported in patients from age 2 to 76 years. Perforation is reported to occur commonly in the second week following onset of illness. Ulceration occurs in the long axis of the bowel. Perforation diameter varies with a mean of 5mm. Multiple perforations are seen in 20% of patients.

Typhoid fever is characterized by fever, Splenomegaly and Rose spots. Patients have headache, respiratory complications and relative bradycardia. The onset of perforation is heralded by sudden increase of abdominal pain, vomiting and distention. However these signs may be obscured in a patient who in a toxic state is obtunded resulting in a delay in diagnosis and treatment.

The diagnosis of typhoid fever can be made by Widal test, culture of organism from blood, bone marrow, urine and stools. Newer diagnostic techniques have been introduced to enable rapid diagnosis of typhoid fever. Histopathology of the specimen might reveal aetiology of perforation.<sup>10,11,12,13</sup>

Typhoid perforation is associated with a significant high mortality rate. This is increased in case patients are managed conservatively.

**TRAUMA<sup>14,15</sup>:** Trauma is a more common cause of ileal perforation in developed countries. The injury may be due to blunt or penetrating trauma. The vast majority of traumatic perforations are from automobile or road traffic accidents. The penetrating injuries are commonly knife stabs or gunshot wounds. The mechanisms of injury postulated are;

1. Crushing or pinching of bowel between the spine and a blunt object.
2. Rupture of a closed loop due to increased abdominal and intraluminal pressure.

The diagnosis of injury is based on clinical findings, X-ray and abdominal paracentesis. X-ray might reveal free gas under the diaphragm. Diagnostic Peritoneal Lavage may reveal blood or bile.

**TUBERCULOSIS<sup>16,17,18</sup>:** Tuberculosis is frequently an under diagnosed cause of ileal perforation. Bowel is involved by ingestion of infected saliva or sputum following pulmonary tuberculosis. Perforation commonly occurs in the hypertrophic variety proximal to the stricture. Multiple strictures and perforations may also be seen.

The diagnosis of tuberculosis is made by demonstrating the tubercles in the intestine and mesenteric lymph nodes. Resection & anastomosis is the procedure of choice. An alternate procedure is resection of the involved segment with ileo-transverse anastomosis. Simple repair is the only procedure possible in some poor risk patients but is associated with increased risk of leak and fistula formation. High mortality rates have been reported.

**Mechanical Causes:** When the perforation occurs secondary to a distal obstruction due to causes such as

hernias, bands, volvulus, intussusception and obstructing growths it is considered to be due to a mechanical cause. The cause is vascular strangulation following obstruction either by a hernia or a band. And gangrenous segment of bowel ruptures possibly as a result of delayed surgical treatment. Increased intraluminal pressure may also lead to perforation.

**Malignancy<sup>19</sup>:** Small intestinal malignancies are very rare accounting for 1-3%. The reported small bowel tumours in order of frequency are adenocarcinoma, carcinoid, lymphoma and sarcoma. The commonest site is the Ileum. Lymphomas are the commonest small bowel tumours to perforate.

**Inflammatory Bowel Disease<sup>20</sup>:** Free perforation is a rare complication in Crohn's disease. Ileum is the commonest site of perforation in this disease.

**Non-Specific Perforation<sup>21,22</sup>:** When the aetiology of ileal perforation is not identified, it is termed as a non-specific perforation. Many of these cases may be due to undiagnosed typhoid or other non-specific causes such as diet, drugs, viral or parasitic infections and infestations. It was earlier attributed to undiagnosed typhoid but these patients have different outcomes when compared to those with typhoid perforation. It has been proposed that sub mucosal vascular emboli may be responsible for such perforations. Drugs such as potassium tablets may cause ulceration and subsequent small bowel perforation.

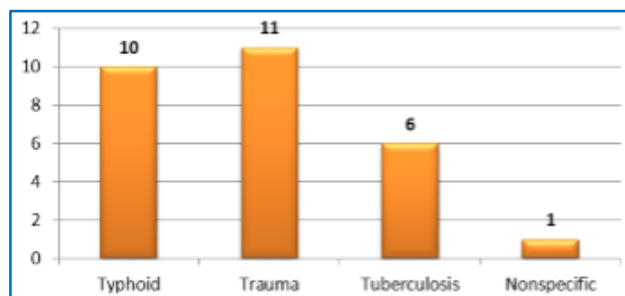
**Others:** Perforation of diverticula is a rare cause of small bowel perforation. Ischemic enteritis is a rare cause of ileal perforation. The miscellaneous causes reported are roundworm infestations, polyarteritis nodosa, radiation enteritis, steroid dependency, and AIDS. Radiation can lead to perforation due to impairment of blood flow and mucosal inflammation.<sup>23</sup>

**RESULTS:** The present study is a prospective study done on 28 patients of ileal perforation due to typhoid complication, nonspecific and traumatic perforations during the period from November 2012 to October 2015.

Diagnosis	Cases	Percentage
Typhoid	10	35.71
Trauma	11	39.28
Tuberculosis	6	21.44
Nonspecific	1	3.57
<b>Total</b>	<b>28</b>	<b>100</b>

**Table 1**

The commonest cause of ileal perforation was trauma followed by typhoid, TB and nonspecific perforations.

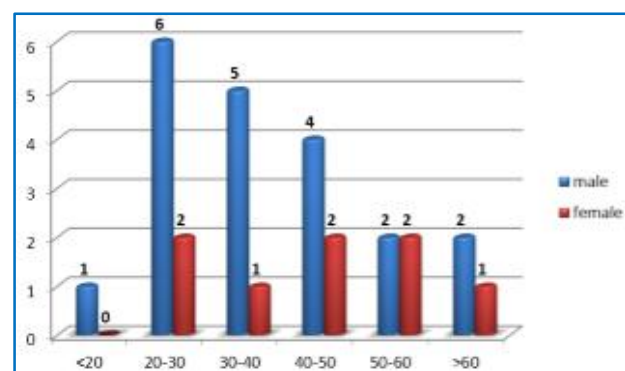


**Graph 1**

Age	Male	Female	Total	Percentage
<20	1	0	1	3.57
20-30	6	2	8	28.57
30-40	5	1	6	21.44
40-50	4	2	6	21.44
50-60	2	2	4	14.28
>60	2	1	3	10.7
<b>Total</b>	<b>20</b>	<b>8</b>	<b>28</b>	<b>100</b>

**Table 2: Age & Sex Distribution**

The age of patients ranged from 15 to 72. Perforation commonly occurred in the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> decade of life with 70% of patients between the ages of 20 and 50. The male to female ratio was 2.5:1.



**Graph 2**

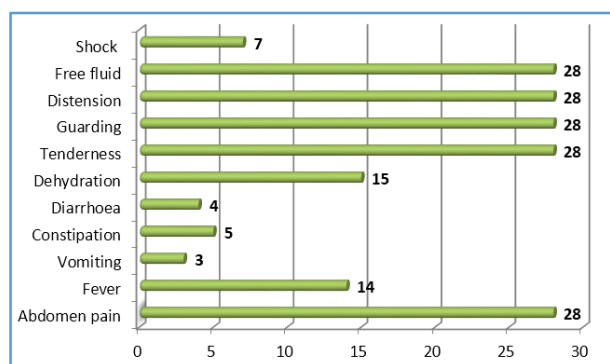
#### ETIOLOGY:

Age	Typhoid			Trauma			TB			Others		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
<20	1	1	0	0	0	0	0	0	0	0	0	0
20-30	5	3	2	2	2	0	1	1	0	0	0	0
30-40	2	1	1	3	3	0	1	1	0	0	0	0
40-50	2	1	1	3	3	0	1	0	1	0	0	0
50-60	0	0	0	2	1	1	2	1	1	0	0	0
>60	0	0	0	1	1	0	1	1	0	1	0	1
<b>Total</b>	<b>10</b>	<b>6</b>	<b>4</b>	<b>11</b>	<b>10</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>1</b>

**Table 3: Age and sex incidence in typhoid, trauma, TB & non-specific perforation**

Symptoms & signs	Number	Percentage
Abdomen pain	28	100
Fever	14	50
Vomiting	3	10.7
Constipation	5	17.85
Diarrhoea	4	14.28
Dehydration	15	53.57
Tenderness	28	100
Guarding	28	100
Distension	28	100
Free fluid	28	100
Shock	7	25

**Table 4: Symptoms and signs**

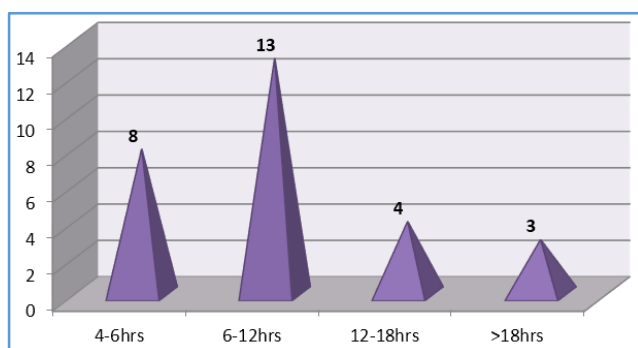


**Graph 3**

**LAG PERIOD:** The time between the onset of pain and the surgical intervention was between 4 and 24 hours.

Interval	Cases	Percentage
4-6hrs	8	28.57
6-12hrs	13	46.42
12-18hrs	4	14.28
>18hrs	3	10.73
<b>Total</b>	<b>28</b>	<b>100</b>

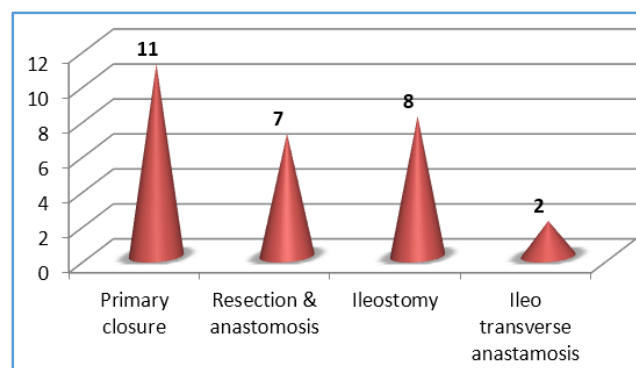
**Table 5**



**Graph 4**

Procedure	Cases	Percentage
Primary closure	11	39.28
Resection & anastomosis	7	25
Ileostomy	8	28.57
Ileo transverse anastomosis	2	7.15
<b>Total</b>	<b>28</b>	<b>100</b>

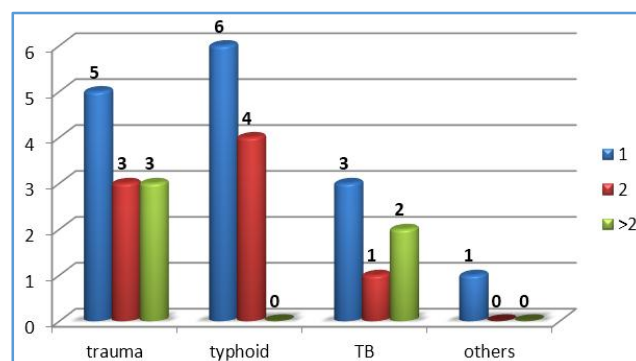
**Table 6: Surgical Procedures**



**Graph 5**

No. of perforations	Trauma	Typhoid	Tb	Others
1	5	6	3	1
2	3	4	1	0
>2	3	0	2	0
<b>Total</b>	<b>11</b>	<b>10</b>	<b>6</b>	<b>1</b>

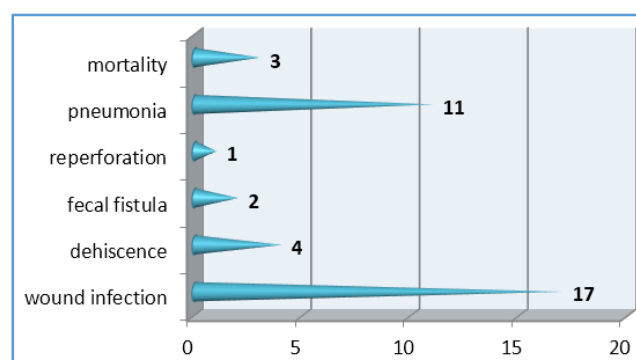
**Table 7: Number of perforations**



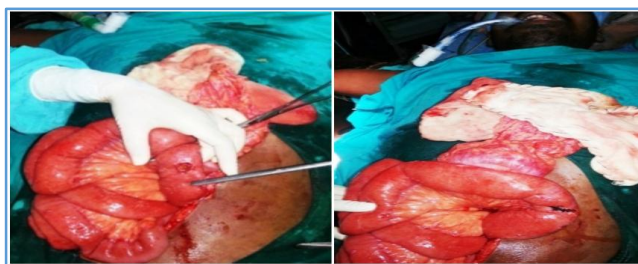
**Graph 6**

Complications	Cases	Percentage
Wound infection	17	60.71
Dehiscence	4	14.28
Faecal fistula	2	7.14
Reperforation	1	3.57
Pneumonia	11	39.28
Mortality	3	10.71

**Table 8: Complications**

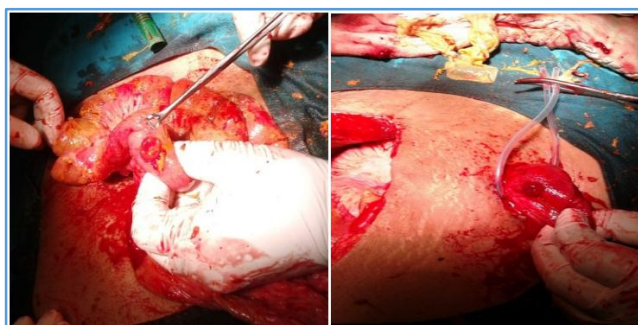


**Graph 7**



***Traumatic ileal perforation and primary closure***

**DISCUSSION:** The commonest cause of ileal perforation in the series was blunt and penetrating trauma accounting for 39.28 % followed by typhoid fever accounting for 35.7 % of cases. Typhoid fever accounted for 56.6% of cases of ileal perforation in the series by Karmakar.<sup>1</sup> Mechanical causes and malignancy is the commonest causes of small bowel perforation in the western world. Mechanical causes and lymphomas accounted for 40.7% of perforations in the series by Dixon.<sup>2</sup> Malignancy was the commonest cause in the series by Orringer.<sup>3</sup> There were no cases of typhoid perforations in either series.<sup>2,3</sup>



***Typhoid ileal perforation with loop ileostomy***

Trauma accounted for 39 % of cases of ileal perforation in this series. 8.25% of ileal perforations in Karmakar study.<sup>1</sup> The rising rate of road traffic accidents and civil violence has contributed to this increased incidence of traumatic perforations.

There was a male preponderance with the male: female ratio in this study being 2.5:1. This preponderance was seen in typhoid, non-specific and traumatic perforations. Typhoid perforations as reported by Eggleston occurred in the second and third decades of life.<sup>24</sup>

Most patients presented with features suggestive of peritonitis. Patients with typhoid perforation had fever, abdominal pain and vomiting. Examination revealed tenderness, guarding, distension and intraperitoneal free fluid. 7 patients were in shock on admission. Eggleston reported that most patients had fever, malaise and sudden increase in abdominal pain in typhoid perforation. Examination revealed signs of toxemia and acute abdomen.<sup>25</sup> Gibney and Gulati reported pneumonia, cholecystitis, gastrointestinal bleed, osteomyelitis and intestinal perforation in patients with typhoid perforation.<sup>26,27</sup> Perforation was commonly seen to occur in the second week following onset of illness. Keenan reported that 88% of patients perforated in the second week.<sup>17</sup>

Lizzaralde reported that 54.2% of patients perforated in the second week.<sup>24</sup> In this series the perforation was around second week of fever.

Free gas was seen under the diaphragm, abdominal X-ray with features suggestive of ileus. Widal was positive in 75% of patients of typhoid perforation. Widal was reported positive in 30% of patients with typhoid perforation by Kaul and in 46.1% of patients by Santillana.<sup>18</sup>

In the management of typhoid perforation some authors advocated conservative management.<sup>28,29</sup> Presently there is no such controversy in the treatment of typhoid perforation with the current recommendation being surgical management.<sup>19</sup> The various methods in use are simple closure, resection and anastomosis, ileotransverse anastomosis and ileostomy. In this study patients underwent simple closure, resection anastomosis. No patients were treated by conservative measures, wedge resection. Resection was employed in typhoid or traumatic perforations wherein multiple perforations were found on laparotomy. Orloff recommended debridement and closure in patients of traumatic perforation where the injury was small and resection anastomosis in patients with large wounds or multiple perforations.<sup>30</sup>

The overall complication rate for all patients in this series was 60%. Typhoid perforations and delayed traumatic perforation are associated with a high morbidity rate. The common complications were wound infection, wound dehiscence, faecal fistula and respiratory complication which compare with published reports. Faecal fistula was seen in 7.14 % of patients. Reexploration was done in 1 patient who had typhoid fever. Patients with traumatic perforations had lesser complications presumably due to a healthier bowel than those patients with typhoid or non-specific perforations. In patients of traumatic perforations outcome is primarily influenced by injury to other organs. The mortality in this series was 10.7%.

**SUMMARY AND CONCLUSIONS:** The present study is a prospective study done on 28 patients of ileal perforation due to typhoid complication, nonspecific and traumatic perforations during the period from November 2012 to October 2015.

1. Trauma and Typhoid are the most common causes of Ileal perforation, followed by TB and non-specific perforation.
2. Patients have a male preponderance and are usually in the second, third and fourth decades of their lives.
3. Widal serology is a useful test in the diagnosis of typhoid fever. Histopathology is useful in the diagnosis of tubercular perforations.
4. Typhoid perforations have a significantly higher morbidity rate than non-specific and traumatic perforations.
5. Mortality in ileal perforations, especially typhoid is high, though the aetiology is not a significant contributing factor. Early stages of traumatic perforations have a good outcome.

6. The type of surgical procedure did not influence outcome, either morbidity or mortality.
7. Lag period significantly influenced outcome.
8. Morbidity was significantly influenced by age, nutrition status, presentation and lag period.

#### BIBLIOGRAPHY:

1. Karmakar SR, Dwivedi Dr, Bhalerao RA. Perforations of terminal ileum. *Indian Journal of Surgery* 1972;34:422-426.
2. Dixon JM, Lamusden AM, Piris J. Small bowel perforation. *Journal of the Royal College of Surgeons of Edinburgh* 1985;30(1):43-46.
3. Orringer RD, John A Collier, Veidenheimer MC. Spontaneous free perforation of the small intestine. *Diseases of Colon Rectum* 1983;26:323-326.
4. Chatterjee H, Jagdish S, Pai D, et al. Changing trends in outcome of typhoid ileal perforations over three decades in Pondicherry. *Trop Gastroenterol* 2001;22(3):155-8.
5. Swadia ND, Trivedi PM, Thakkar AM. The problem of enteric ileal perforation. *Indian Journal of Surgery* 1979;41:643-651.
6. Keenan JP, Hadley GP. The surgical management of typhoid perforation in children. *Br J Surg* 1984;71(12):928-9.
7. Santillana M. Surgical complications of typhoid fever: enteric perforation. *World J Surg* 1991;15(2):170-5.
8. Archampong EQ. Typhoid ileal perforations: why such mortalities? *Br J Surg* 1976;63(4):317-21.
9. Badejo OA, Arigbabu AO. Operative treatment of typhoid perforations with peritoneal irrigation. A comparative study. *Gut* 1980;21:141-145.
10. Kaul BK. Operative management of typhoid perforation in children. *Int Surg* 1975;60(8):407-10.
11. Bibhat K Mondal. Salmonella infections. In Gordon Cook eds. *Manson's tropical diseases*. London. ELBS, 1994;12th Edition:853.
12. Ananthanarayan, Jayaram Paniker CK. Enterobacteriaceae III-Salmonella. *Textbook of Microbiology*, Madras, Orient Longman, 1994;4th Edition:285.
13. Rains AJ, Ritchie HD. Bailey and Love's short practice of surgery. London, Chapman and Hill, 1977;17th Edition:979.
14. Koul R, Malik MS. Blunt abdominal trauma with intestinal injury. *Ind J Surg* 1987;221-224.
15. Elmo J Cerise, James H Scully. Blunt trauma to the small intestine. *The Journal of Trauma* 1970;10(1):46-50.
16. Agarwal S, Gera N. Tuberculosis-an underestimated cause of ileal perforation. *J Indian Med Assoc* 1996;94(9):341-352.
17. Arun Kakar RC, Aranya, Nair SK. Acute perforation of small intestine due to tuberculosis. *Aust N Z J Surg* 1983;53:381-383.
18. Wig JD, Chaudhary A, Gupta NM. Free perforation of tuberculous ulcers of small bowel. *Ind J Gastroenterol* 1985;4(4):241-254.
19. Sweetman WF, Wise RA. Acute perforated tuberculous enteritis-surgical treatment. *Ann Surg* 1959;81(2):184-188.
20. Augustin A Burgos, Mignel E Martinez, Bernard M Jaffe. Small bowel tumors. In Michael J Zinner, eds. *Maingot's abdominal operations*. 1997;10th Edition:1178-79.
21. David M Steinberg, Trevor Cooke W, Alexander Williams J. Free perforation in Crohn's disease. *Gut* 1973;14:187-190.
22. Goehrs HR, Morlock CG, Dockerty MB. Primary non-specific ulcers of the small intestine. *Proceedings of the Staff Meetings of the Mayo Clinic* 1957;32:351-353.
23. Faquharson-Roberts MA, Giddings AEB, Nuna J. Perforations of small intestine due to slow release potassium chloride. *Br Med J* 1975;2:206.
24. Risto Huttunen, Malti D, Kairaluoma, et al. Non-traumatic perforation of small intestine. *Surgery* 1977;81(2):184-188.
25. Eggleston FC, Santoshi B, Singh CM. Typhoid perforation of bowel. *Ann Surg* 1979;190(1):31-35.
26. Washington C Winn Jr, John M Kissane. Bacterial diseases. In: Ivan Damjanov, James Linds, Eds. *Anderson's Pathology*, Missouri, Mosby. 1996;10th Edition:788-789.
27. Gibney EJ. Typhoid perforation. *Br J Surg* 1989;76:887-889.
28. Gulati PD, Saxena SN, Bact D, et al. Changing pattern of typhoid fever. *Am J Surg* 1968;45:544-548.
29. Hook EW, Guerrant RL, Salmonellosis. In Wintrobe MM, eds. *Harrison's principles of internal medicine*, McGraw Hill. 1977;7th Edition:843.
30. Marshal J Orloff, Crane Charters. Injuries of the small bowel and mesentery and retroperitoneal hematoma. *Surgical Clinics of North America* 1972;52(3):729-734.