



Surgery

SPECTRUM OF SECONDARY PERITONITIS IN NORTH COASTAL ANDHRA PRADESH, INDIA.

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KEYWORDS :

Introduction:

Generalized peritonitis is a common surgical emergency in developing countries [1]. Despite advances in surgical techniques, good antimicrobial therapy and intensive care support, it carries high morbidity and mortality while its management remains difficult and complex [2]. The spectrum of secondary peritonitis in tropical countries differs from western counterparts [2]. The management approach requires both knowledge of the signs and symptoms of peritonitis to aid diagnosis and an understanding of common causes to assist the surgeon in appropriate surgical care. Peritonitis can be classified as primary, secondary or tertiary, depending upon the source of microbial contamination. Primary peritonitis is secondary to extra peritoneal sources, the infection spreading mainly through haematogenous dissemination without visceral perforation. Secondary peritonitis, on the other hand is caused by resident flora of the gastrointestinal or urogenital tracts, the organisms reaching peritoneum secondary to a mechanical breach, Tertiary peritonitis may be defined as a severe recurrent or persistent intra abdominal infection after apparently successful and adequate surgical source control of secondary peritonitis [3].

Material and methods:

This study was conducted at King George Hospital (KGH) in Vishakhapatnam, the capital of North Coastal Andhra Pradesh, during the calendar years JULY 2014- JUNE 2016. KGH is a 1085 bedded tertiary care hospital rendering services to the people of North Coastal Andhra Pradesh and adjacent districts of Orissa and Chhattisgarh. The hospital has a 24 hours casualty department, 30-bedded surgical intensive care unit, several open wards with capacity for around 250 surgical patients, and equipped with two emergency operating rooms. A retrospective study of 455 patients of secondary peritonitis was done over a period of last two years (July 2014- June 2016) at KGH, Visakhapatnam.

Inclusion criteria:

All cases found to have peritonitis as result of mechanical breach in gastrointestinal and uro-genital tract were included in study.

Exclusion criteria:

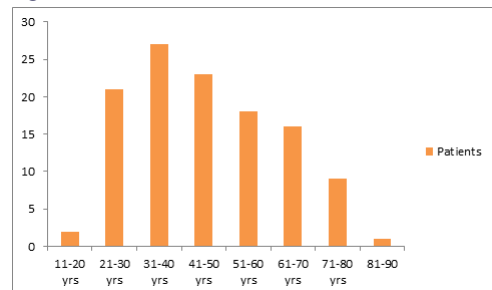
All the cases with either primary peritonitis or that due to anastomotic leak post surgically were excluded.

All cases were studied in terms of clinical presentation, radiological evaluation, operative findings and postoperative course. Data collected from outpatient department, casualty records, emergency operation theatre and post op ward records and death records. Data includes gender, age, date of admission, date of surgery, date of discharge or death, surgical procedure and operative diagnosis, date of onset and type of symptoms, presence of guarding, rebound tenderness or rigidity and abdominal quadrant(s) affected, vital signs on presentation including temperature, heart rate, blood pressure and respiratory rate. The results of initial complete blood counts, results of abdominal ultrasound, X-ray erect abdomen, biochemical values (Creatinine and potassium values) were also taken into consideration.

Results:

Of the 455 cases that were studied, mean age of presentation was 40.47 years (range from 11 to 90 years) with majority of patients being males 358(78.68%) and the remaining 97(21.31%) being females. The male

predominance over female (male/female-3.6:1) is similar to other studies [1, 2]. Majority of the patients 94/455 were in 41-50 years age group (20.65%) followed by 89/455 in 31-40 years age group (19.56%) and 88/455 in 21-30 years age group (19.34 %) and 85/455 (18.68%) were in age group 51-60 years. 403 (88.57%) cases were of below 60 years age group. 52 cases (11.42%) were of the age above 60 years. Some patients had pre-existing illness 67(14.72%). Youngest patient in our study was a 12 year old boy and oldest was an 85 year old gentleman. (Bar diagram-1).

Bar Diagram - I

Majority of the patients (440/455) presented with history of pain abdomen, 312 patients with vomiting, fever in 290, abdominal distension in 372 and altered bowel habits in 356 and 56 patients presented with shock due to septicemia. 22% of patients gave past history of NSAIDS use and 5% of patients gave history of preceding fever followed by onset of peritonitis, symptom suggesting of typhoid aetiology. Among 410 patients who presented with guarding and rigidity, only 98 patients had localised signs while 312 had generalised guarding and rigidity. (Table-1)

Table – 1 Preoperative Data

Age group	
>61yrs	52/455(11.42%)
<60yrs	403/455(88.57%)
Pre- Existing illness	67/455(14.72%)
Respiratory disease	15/67
Renal Disease	18/67
Cardiovascular	08/67
Malignancy	21/67
Others	05/67
Clinical Features	
Pain	440/455
Vomiting	312/455
Fever	290/455
Abdominal Distension	372/455
Altered Bowel Habbits	356/455
Guarding and Rigidity	410/455
Localised	98/410
Generalised	312/410
Shock	56/455
Investigations	
Hypokalemia (3.0 mg/dl)	51/455
S.Creatining (>1.7mg/dl)	80/455
X-Ray erect abdomen showing pneumoperitonium	295/455

Clinical presentation of the patients varied according to site and cause of perforation [4, 5]. The patients of perforated peptic ulcer (14)3 usually had a short history of pain starting in epigastrium or upper abdomen along with generalised tenderness and guarding [4, 5]. Among them 22% of patients gave the history of NSAIDS use.

Rajendhar singh et al studied 504 cases of gastrointestinal perforations and found that 54(12%) patients developed secondary peritonitis secondary to perforated appendix [4]. However, in our series, secondary peritonitis due to appendicular perforations was the underlying cause in 114 (25.02% of patients). The patients of appendicular pathology usually presented with initial pain abdomen around umbilicus and right iliac fossa then spreading to whole abdomen. Afridi SP had also reported that the patients who developed secondary peritonitis due to perforated appendix present with the typical history of pain starting in the periumbilical region than shift to the right iliac fossa, or originated directly in the right iliac fossa and then spread to all over the abdomen [5]. In most of these patients guarding and rigidity was localised to right lower quadrant of abdomen. The patients with perforated appendix belonged to younger age group [5].

Patients with illeal perforation presented with central abdominal pain and with history of prolonged fever [4, 5]. Patients with gangrenous bowel secondary to intestinal obstruction presented with classical features of intestinal obstruction like diffuse pain abdomen, vomiting, constipation and distension of abdomen. These features are also associated with generalised guarding and rigidity suggestive of peritonitis.

Diagnosis of hollow viscous perforation was made in majority of patients with help of a simple plain X- ray of the erect abdomen. But only 295(64.83%) patients had air under diaphragm on X-ray of the erect abdomen [4, 5]. However in the remaining cases the diagnosis was made with the help of ultrasonography or CECT of the abdomen. Electrolyte imbalance in form of hypokalemia was seen in 51(11.2%) patients and serum creatinine was raised in 80(17.58) patients.

All patients were resuscitated starting with insertion of two 16-gauge cannulas, naso-gastric tube and Foley's catheter. All patients received adequate fluid replacement, analgesic support and adequate antibiotic coverage depending upon the local sensitivity of organisms. With the confirmation of the initial diagnosis of intestinal perforation, emergency laparotomy was performed in all 603 patients. Perforations in the G.I.T were treated either with primary double-layered closure, appendicectomy, segmental resection and anastomosis or loop ileostomy/colostomy depending upon the operative findings and general status of the patients. The peritoneal cavity was irrigated with an average of 3 litres of warm normal saline and drains were left in abdomen and wound was closed either as mass closure or in layers depending upon the operator's choice. Patients were monitored post-operatively for recovery and early detection and management of complications.

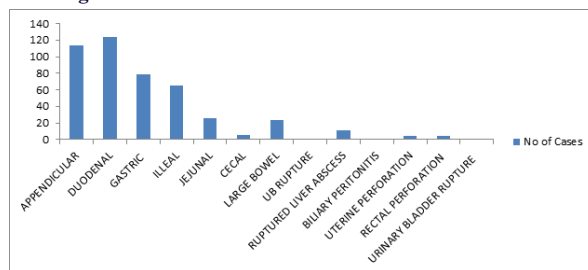
Perforated duodenal ulcer which was seen in 124 patients (27.25%) was the most common cause of secondary peritonitis followed by gastric perforation in 79 patients (17.36%), appendicular perforation in 114 patients (25.05%), small bowel perforation in 91 patients (19.98%), large bowel perforations in 23 patients (4.17%), ruptured liver abscess in 11 patients (2.41%), biliary peritonitis in 1 patient (0.21%), uterine perforation in 4 cases(0.87%) and bladder rupture in 1 patient(0.21%).

Table-2

Diagnosis	No. of Cases	%
APPENDICULAR	114	25.05
GASTRO DUODENAL	124	27.25
DUODENAL	79	17.36
GASTRIC	203	44.61
SMALL BOWEL PERFORATION	65	14.28
ILLEAL	26	5.7
JEJUNAL	91	19.98
LARGE BOWEL	23	4.17
RUPTURED LIVER ABSCESS	11	2.41
BILIARY PERITONITIS	1	0.21
UTERINE PERFORATION	4	0.87
RECTAL PERFORATION	4	0.87

URINARY BLADDER RUPTURE	1	0.21
OTHERS	6	1.29

Bar Diagram - 2



Among the 203 cases of gastro duodenal perforation 183 are due to acid peptic disease and 18 cases were due to malignancy and 2 cases were due to traumatic gastric perforation. Among the 183 perforations due to peptic ulcer disease 122 were due to duodenal perforation the remaining 61 were due to perforation of benign gastric ulcer. Duodenal to gastric perforation ratio is 1.5:1 compared to other studies conducted in India which is 7:1 [4] and 15:1 [2]. Contrary to this the ratio was 4:1 in United Kingdom [6] and 4:1 in United States [7]. Gastric ulcer rarely present with perforation peritonitis compared to duodenal ulcer, gastric perforations are related to the wide spread use of NSAIDS [8], as seen in our study 22% patients have positive NSAIDS abuse. Gastric malignancy can present as perforated gastric ulcer which accounts for 1% of its complications. Perforated gastric ulcer have high incidence of malignancy compared to other parts of G.I.T [9], as seen in our study, out of 79 gastric perforations 16 were malignant.

Among the 91 cases of small bowel perforation, 38 cases are of enteric fever, of which 2 cases presented with multiple perforations involving distal ileum. Of the remaining small bowel perforation cases, 20 were due to gangrenous bowel, 45 were due to trauma and 2 were due to illeo-cecal tuberculosis. Perforation due to illeo-cecal tuberculosis per se is rare. Most common presentation is hyperplastic illeo-cecal tuberculosis resulting in obstruction. Perforation usually occurs during the usage period of anti-tubercular regimen [10], as seen in our study two cases were presented during anti tubercular treatment period. Among the traumatic small bowel perforation cases, 15 were associated with mesenteric tear and 5 were associated with splenic lacerations resulting in splenectomy. Among 45 cases of traumatic small bowel perforations, 2 were jejuna of which 1 was jejunal transection, remaining 43 were illeal of which 5 were having illeal transections.

Among the 34 cases of large bowel perforations, 18 were due to gangrenous sigmoid volvulus, 8 were due to malignancy of recto sigmoid junction among which one patient had synchronous growth in ascending and transverse colon and 8 cases were due to trauma. Among these traumatic cases 2 were in cecum, 3 were in transverse colon and 3 were in recto sigmoid junction.

Among the 9 cases of peritonitis due to pancreatic pathology, 7 were due to necrotising pancreatitis and 2 were due to pancreatic injury. Of these 2, one was associated with splenic laceration. Pancreatic necrosis occurs in approximately 20% of patients with acute pancreatitis and is necessary for the development of secondary pancreatic infection. However, pancreatic necrosis by itself, even when accompanied by organ failure, is not an absolute indication for surgery. A trial of medical treatment for all patients with sterile pancreatic necrosis is in order [11].

Among the 12 cases of biliary peritonitis 10 were due to gall bladder perforation and 2 were due to cystic duct leak a complication of laparoscopic cholecystectomy. Gall bladder perforation has been reported to occur in 3 to 10% cases of acute cholecystitis in adults [12]. Risk factors for gall bladder perforation in adults include: age greater than 60 years, immunosuppression, steroid use, and severe systemic disease [12].

All patients of gastro duodenal perforation (343) were treated with primary closure of perforation. Among these, 29 patients had large perforation of more than 3 cm's for which edge biopsy from the ulcer was done and perforation was closed with Graham's patch among them

24 cases had histo-pathological reports suggestive of malignancy. Laparoscopic repair of gastro-duodenal perforation by running sutures is an option [13]. All patients of appendicular perforation were managed with appendicectomy and local peritoneal lavage [4, 5].

All cases of typhoid ileal perforation were treated with simple primary closure of perforation. Primary repair of the typhoid perforation is a safe and effective treatment [14], laparoscopic repair is another option [15]. Those with multiple ileal perforation involving distal ileum result in resection of affected segment followed by ileo ascending anastomosis. All cases of traumatic small bowel perforation were treated with primary closure, while those of jejuna! and ileal transections were treated with resection and anastomosis. Among the 20 cases of gangrenous small bowel leading to secondary peritonitis 9 cases underwent ileo-ileal, 6 cases underwent ileo-jejunal, 2 cases underwent ileo-ascending and 3 cases ileo transverse anastomosis. Among the 2 cases of iliocecal tuberculosis one was treated with right hemicolectomy and one was treated with peritoneal lavage. Among the 34 cases of large bowel perforation 18 were due to sigmoid volvulus for which sigmoidectomy followed by end colostomies, 8 cases of malignant perforation 7 were treated with diversion loop colostomies, one patient due to synchronous growth in ascending and transverse colon resulted in ileostomy. Among the 2 cases of cecal perforation one was treated with primary closure and one patient resulted in cecostomy.

All cases of secondary peritonitis due to ruptured liver abscess treated with laparotomy and drainage of abscess cavity. All cases of secondary peritonitis due to pancreatic pathology were treated with laparotomy and lavage.

Cases of biliary peritonitis due to ruptured gall bladder treated with emergency open cholecystectomy by subcoastal Kocher's incision and peritonitis due to cystic duct leaks were treated with laparotomy and closure. All cases of peritonitis due to bladder rupture were treated with laparotomy and primary closure.

Post operative complications recorded were wound infection in 10.61%, electrolyte imbalance in 9.76%, septicaemia in 5.46%, pneumonia in 3.47%, intra abdominal collection in 1.66% and wound dehiscence in 0.83%. (Table-4)

Table-4 Postoperative complications

Wound infection 64 (10.61%)
Electrolyte imbalance 59 (9.76%)
Septicaemia 33 (5.46%)
Pneumonia 21 (3.47%)
Abdominal collection 10 (1.66%)
Wound dehiscence 5 (0.83%)
Overall morbidity 192 (31.78%)
Mortality 8.95% (54/603)

The overall mortality associated with peritonitis was 8.95% (54/603). The highest mortality was observed in necrotising pancreatitis leading to peritonitis in 33.33% (3/9) and in biliary peritonitis 25.00% (3/12). The mortality associated with ruptured liver abscess was 22.22% (4/18) and small bowel perforation was 9.73% (11/113). Large bowel was associated with mortality of 5.80% (2/34). In spite of its high incidence perforation due to acid peptic disease had a mortality of 9.80% (31/316) which is very less compared to other studies.

The overall morbidity in our study was 31.78% and mortality was 8.95% comparable with other studies [6, 7] despite delay in treatment. This was probably attributed to lower mean age of patients in our study. Morbidity and mortality was more in patients who presented late to emergency department and in elderly patients who were more than 60 years old and patients with pre existing co-morbid illness [4, 5]. Table-3

Discussion:

This study outlines the aetiology, associated presenting symptoms, signs and outcomes of surgically managed peritonitis in a tertiary care centre in Vishakhapatnam. Perforation peritonitis is a frequently encountered surgical emergency in tropical countries like India as has been the experience in our centre. As per studies done previously in tropical countries it is commonly encountered in the younger age group with mean age of 36.8 years [2]. The mean age of perforation peritonitis in our study was 43.58 years which is not comparable to

most of the studies of western where mean age is more than 60 years [6, 23]. Our study of secondary peritonitis showed a male preponderance which is similar to studies conducted in other areas of Indian subcontinent [2, 4 and 5].

Perforation of proximal part of the GIT was more common in our study which is similar to another study conducted in India [2]. But in contrast to the studies of western countries where perforation is common in the distal part of GIT like Japan [16], America [17] and Greece [18]. This is also in contradiction to other studies in India as well like study by Quereshi AM [19] who reported that majority of perforations involve distal gastrointestinal tract such as ileum.

Not only the site but the etiological factors also show a wide geographical variation. Khanna et al [20] from Varanasi studied 204 cases of G.I.T perforation among them 108 cases were due to small bowel perforation which was attributed to typhoid aetiology which is predominant in some parts of tropical countries. Noon et al [21] from Texas studied 430 patients of G.I.T perforation and found 210 cases to be due to penetrating trauma, 68 due to peptic ulcer. This shows the importance of trauma in developed countries, while infectious (typhoid, *Helicobacter pylori*) and analgesics abuse in developing countries.

Duodenal ulcer perforation was the most common perforation noticed in our study as compared to other studies [5] and study conducted by Gupta S and Kaushik R [24].

Gastroduodenal perforation was commonly seen in the 4th and 5th decade in our study. The mean age of presentation of duodenal ulcer is 43.81 years and the mean age of gastric perforation is 48.57 years which less compared to the study in west where the perforation was commonly seen in 6th and 7th decades [6, 7]. This is the reason why mortality due to peptic ulcer disease is less despite of its higher incidence.

It is noticed in our study that proper hydration, good antibiotic cover and simple closure of perforation significantly reduced mortality rate [2, 4 and 5]. Early diagnosis and treatment leads to improved results in terms of mortality and morbidity. Majority of patients in our series presented late with the time interval between the onset of symptoms and admission varying from 6hrs hours to 10 days with an average of 3.4 days. Delay in seeking treatment associated with other factors such as pre existing illness was one of the major reasons for high mortality and morbidity in our series. Kaur N et al., in their study also attribute delay in seeking surgical treatment as an important cause for high morbidity [22]. Interestingly, we also found positive correlation between the duration of symptoms and mortality, while Kotiso et al. noted 7.6% mortality rate in patients with symptoms of 2 days or less, compared with 25% among those with symptoms over 2 days in duration [25].

Surgical treatment of secondary peritonitis is highly demanding. Some authors have adopted laparoscopy as preferred surgical approach for the management of secondary peritonitis [14]. Laparoscopy is an emerging facility and in emergency setup, it is still in its infancy, being performed in only a few medical institutions of India. Due to the non-availability of laparoscopy in our emergency setup during the study period, no patient was treated laparoscopically.

Conclusion:

The presentation of secondary peritonitis in India continues to be different from its western counterpart. In majority of cases the presentation to the hospital was late with well established generalized peritonitis with purulent/fecal contamination and varying degree of septicemia. Good pre-operation assessment and early management will decrease the morbidity, mortality and complications of secondary peritonitis.

Reference

- 1) Adesunkanni, A. R. K. et al. "Acute Generalized Peritonitis In African Children: Assessment Of Severity Of Illness Using Modified APACHE II Score". ANZ J Surg 73.5 (2003): 275-279. Web.
- 2) Dorairajan LN, Gupta S, Deo SV, Chumber S, Sharma L: Peritonitis in India- A decade's experience. Tropical Gastroenterology 1995, 16(1):33-38.
- 3) Ordoriez, Carlos A. and Juan Carlos Puyana. "Management Of Peritonitis In The Critically III Patient". Surgical Clinics of North America 86.6(2006): 1323-1349. Web.
- 4) Jhobta, Rajender et al. World J Emerg Surg 1.1 (2006): 26. Web. 11 July 2016.
- 5) Afridi, Shahida P et al. "Spectrum Of Perforation Peritonitis In Pakistan: 300 Cases Eastern Experience". World J Emerg Surg 3.1 (2008): 31. Web.
- 6) Crawford E, Ellis H. "Generalised peritonitis-The changing spectrum. A report of 100

- consecutive cases". *Br J Clin Pract* 1985;5:177-78.
- 7) People TB: "Candida with perforated peptic ulcer". *World J Surg* 1986;100:758-64.
 - 8) Ohene-Yeboah, M and B Togbe. "Perforated Gastric And Duodenal Ulcers In An Urban African Population". *West African Journal of Medicine* 25.3 (2007): n. pag. Web.
 - 9) Roviello Franco, Rossi Simone, Marrelli Daniele, De Manzoni Giovanni et al. "Perforated Gastric Carcinoma; A Report Of 10 Cases And Review Of The Literature". *World J Surg Oncol* 4.19 (2006): n. pag. Print.
 - 10) KASAHARA, Kei et al. "Tuberculous Peritonitis Developing During Chemotherapy For Pulmonary And Intestinal Tuberculosis: A Case Report". *Respirology* 10.2 (2005): 257-260. Web.
 - 11) Bradley, Edward L. and Keith Allen. "A Prospective Longitudinal Study Of Observation Versus Surgical Intervention In The Management Of Necrotizing Pancreatitis". *The American Journal of Surgery* 161.1 (1991): 19-25. Web.
 - 12) Petrozza, John, Joan Mastrobattista, and Manju Monga. "Gallbladder Perforation In Pregnancy". *Amer J Perinatol* 12.05 (1995): 339-341. Web.
 - 13) K.ninger, J.rg et al. "Laparoscopic Repair Of Perforated Gastroduodenal Ulcer By Running Suture". *Langenbeck's Archives of Surgery* 389.1 (2004): 11-16. Web.
 - 14) Ramachandran, C S et al. "Laparoscopic Surgical Management Of Perforative Peritonitis In Enteric Fever". *Surgical Laparoscopy, Endoscopy & Percutaneous Techniques* 14.3 (2004): 122-124. Web.
 - 15) Saxe, Jonathan M. and Robert Cropsey. "Is Operative Management Effective In Treatment Of Perforated Typhoid?". *The American Journal of Surgery* 189.3 (2005): 342-344. Web.
 - 16) Shinagawa, N et al. "A Bacteriological Study Of Perforated Duodenal Ulcer.". *lap J Surg* 21.17 (1991): Web.
 - 17) Washington BC, Villalba MR, and Lauter CB. "Cefamandole- Erythromycin- Heparin Peritoneal Irrigation. An Adjunct To The Surgical Treatment Of Diffuse Bacterial Peritonitis.". *World Journal of surgery* 94.576 (1983): 81. Web.
 - 18) Nomikos IN, Katsouyanni K, and Papaioannou AN. "Washing With Or Without Chloremphenicol In The Treatment Of Peritonitis. A Prospective Clinical Trail.". *World Journal of surgery* 99 (1986): 20-25. Web.
 - 19) Samuel, Jonathan C et al. "An Observational Study Of The Etiology, Clinical Presentation And Outcomes Associated With Peritonitis In Lilongwe, Malawi". *World J Emerg Surg* 6.1 (2011): 37. Web.
 - 20) Khanna, A. K. and M. K. Misra. "Typhoid Perforation Of The Gut". *Postgraduate Medical Journal* 60.706 (1984): 523-525. Web.
 - 21) Noon GP, Beall AC, and Jorden GL. "Clinical Evaluation Of Peritoneal Irrigation With Antibiotic Solution.". *World J of surg* 67.73 (1967). Web.
 - 22) Kaur, Navneet, Manish K. Gupta, and Vivek Ratan Minocha. "Early Enteral Feeding By Nasoenteric Tubes In Patients With Perforation Peritonitis". *World J. Surg.* 29.8 (2005): 1023-1027. Web.
 - 23) SVANES, CECILIE et al. "A Multifactorial Analysis Of Factors Related To Lethality After Treatment Of Perforated Gastroduodenal Ulcer". *Annals of Surgery* 209.4 (1989): 418-423. Web.
 - 24) Gupta Sanjay and Robin Kaushik. "Peritonitis - The Eastern Experience ". *World J Emerg Surg* 1.1 (2006): 13. Web.
 - 25) Kotiso B and Abdurahman Z. "Pattern Of Acute Abdomen In Adult Patients In Tikur Anbessa Teaching Hospital, Addis Ababa, Ethiopia.". *East and Central African Journal of Surgery* 12.12 (2007): 47-52. Web.