

A clinical study on etiology and clinical manifestations in peptic perforation in a tertiary care teaching hospital, West Bengal

Lokenath Mondal¹, Sukumar Maiti², Sukanti Bhattacharyya^{3*}, Shib Sankar Roy Chowdhury⁴

¹Senior Resident, Department of General Surgery, Basirhat Super Speciality Hospital, Basirhat, West Bengal 743412, India

Professor & Head, Department of General Surgery, ICARE Institute of Medical Sciences and Research, Banbishnupur, Purba Medinipur, Haldia, West Bengal 721645, India

³Associate Professor, Department of Medical Physiology, ICARE Institute of Medical Sciences and Research, Banbishnupur, Purba Medinipur, Haldia, West Bengal 721645, India

⁴Associate Professor, Department of General Surgery, Medical College & Hospital, Kolkata 88, College St, College Square, Kolkata, West Bengal 700073, India

Received: 05-02-2021 / Revised: 28-03-2021 / Accepted: 01-04-2021

Abstract

Background: Peptic ulcer disease results from an imbalance between stomach acid-pepsin and mucosal defense barriers. In the presence of risk factors, recurrence of ulcer is common despite initial successful treatment. Present study was done to see the proportion of various parameters (type, age, gender etc) in peptic perforation cases attending surgical emergency of Medical College and Hospital, Kolkata. Study was also done to recognize the aetiological factors; study the different clinical manifestations of peptic ulceration and to evaluate the outcome of early operation.

Materials & Methods: Altogether 60 cases were selected for the present study. The detailed present and past history were carefully elicited, from which the age and sex incidence, onset of presenting symptoms of peritonitis (to determine the time between the perforation and operation) and other symptoms regarding duration, possible etiological factors, family and personal history (i.e. diet, habit, addiction) were recorded. Pre-operative straight x-ray of abdomen and chest in erect posture was done in every case and the presence or absence of free gas, under right dome of the diaphragm was recorded. A serum electrolyte was done in all cases. Routine haematological investigations, such as Hb%, total and differential count of WBC were done in all cases and serum amylase estimation of blood was done in some cases, where clinical diagnosis was in doubt. **Results:** In the present study of 60 patients-- out of there 51 male and 9 female cases --were recorded. Male 85% and female 15% and male: female was 5.67:1. The duodenal ulcer perforation was commonest (42.30%) in the (31-40) years age groups. Pain abdomen was the commonest symptom in all (100%) patients. In 16% cases the hemoglobin level was below 70%, poor nutritional preexisting anemia can be justified. Leucocytosis in a range of 10,000 to 20,000/cumm is noticed in maximum number of cases. In the present study abdomen and chest x-ray in erect posture were done in all 60 cases. Pneumoperitoneum was detected in 91.67 % of patients. **Conclusion:** A proper history and physical examination aided by radiological examination like plain X-ray of abdomen in erect posture and X-ray chest in erect posture help in arriving at an easily accurate diagnosis and proper management. Interval between perforation and repair is very important and is often life saving.

Keywords: Peptic ulcer disease, peptic perforation, etiology, clinical manifestations, diagnosis, West Bengal.

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Introduction

Peptic perforation is one of the common complications of peptic ulcer diseases despite the use of various anti-ulcer agents and eradication therapy [1]. Important etiological factors in the peptic ulcer diseases are infection with *H. pylori*, followed by chronic NSAIDs intake, chronic alcohol intake, cigarette smoking, and smoked foods, ---as in Japan people eat smoked--- fish, spicy foods, and irregular diet intake and in type A personalities [1]. Common site for peptic ulcers are first part of duodenum and the lesser curvature of the stomach, may also occur on the stoma after gastric surgery, esophagus and even in Meckel's diverticulum [1]. The two major factors associated with peptic ulcer perforation are thought to be cigarette smoking and NSAIDs use; these are thought to contribute to perforation in greater than 75% and 20% to 30% respectively of

patients who perforate [2]. An anterior ulcer perforates usually and bleeds rarely while posterior ulcers penetrate [3]. Role of *H. pylori* in perforation is less clear. A study from Hong Kong showed that 70% of patients who had perforated duodenal ulcer had positive biopsies for *H. pylori*. This infection rate was not remarkably different from the 55% prevalence of *H. pylori* in general population [4]. A study from United Arab Emirates reported 24 out of 29 patients who underwent simple closure of perforated duodenal ulcer were tested for *H. pylori* by urease breathe test on 8th postoperative day were tested positive [5]. In a report from UK 47% of patients who had perforated duodenal ulcer were found to be positive for *H. pylori* by ELISA. This compared with 50% of control population and suggested no relationship between *H. pylori* and perforation [6]. Peptic ulcer perforation is rare before adolescence, common in 30-40 years of age group, and is more common in men than in women [7]. Although 70% of ulcer patients are between the ages of 25 and 64, the peak prevalence of complicated ulcer disease requiring hospitalization is in the age group 65 to 75 years [8, 9]. Abdominal pain, cardinal symptom of perforation is sudden in onset and may wake up the patient from sleep, tearing type, starts in the epigastrium

*Correspondence

Dr. Sukanti Bhattacharyya

Associate Professor, Department of Physiology,
ICARE Institute of Medical Sciences and Research, Banbishnupur,
Purba Medinipur, Haldia, West Bengal 721645, India
E-mail: sukantib514@gmail.com

and radiates to tip of the shoulder. Erect x-ray abdomen which shows air under diaphragm clinches the diagnosis, in addition to this clinical signs such as obliteration of liver dullness, abdominal rigidity which is constant and continuous, some may be in shock due to fluid lost in third space, during which resuscitation with fluids is of utmost importance [10, 11]. Present study was done to see the proportion of various parameters (type, age, gender etc) in peptic perforation cases attending surgical emergency of Medical College and Hospital, Kolkata. Study was also done to recognize the aetiological factors; study the different clinical manifestations of peptic ulceration and to evaluate the outcome of early operation. It was also done to check the post operative follow-up for residual symptoms and any further complications.

Materials & methods

The present study was conducted in the Medical College & Hospital, Kolkata, during the period- January 2017 to October 2017. Patients, presenting in the out-patient department (OPD) and Emergency of the Department of General Surgery in Medical College and Hospital, Kolkata, with features of peptic perforation were chosen for study. Altogether 60 cases were selected for the present study. Definitive operations could be done in 6 cases, while the rest were managed by simple closure with or without omental patch. The Emergency surgeons concerned were of good experience, acceptable dexterity and well conversant with definitive operations. Anaesthetists, handling the emergency operations were experienced and qualified. The cases were studied during the entire period of their hospital stay. After discharge, they were followed up in the outpatient department (OPD) to the month of April 2018.

Inclusion Criteria

All patients diagnosed as a case of peptic perforation either pre-operatively or during operation, providing valid consent for examination and surgical managements.

Exclusion Criteria

1. Patient not providing consent for surgery
2. All traumatic cases
3. Hollow viscus perforations other than peptic perforation

The detailed present and past history were carefully elicited, from which the age and sex incidence, onset of presenting symptoms of peritonitis (to determine the time between the perforation and operation) and other symptoms regarding duration, possible etiological factors, family and personal history (i.e. diet,

habit, addiction) were recorded. The general condition of the patient was assessed. Presence of pallor, cyanosis and jaundice, dehydration, restlessness, pulse, respiration, temperature and blood pressure were recorded as routine measures in all the cases. The degree of shock was also assessed with the above mentioned parameters and urine output. Usual clinical methods were applied i.e. inspection, palpation, percussion and auscultation. Any scar mark of previous operation was looked for. The shape of the abdomen and movement with respiration were recorded, rigidity, muscle guarding were carefully noted. The upper border of liver dullness was recorded to find out whether it is obliterated or not. Abdomen was carefully auscultated to see whether peristalsis was present or not, and if present its character was noted. Rectal examination was done in every case and any collection in rectovesical and / or rectovaginal pouch was recorded. Lastly, respiratory system, cardio-vascular system and other systems were examined carefully. Pre-operative straight x-ray of abdomen and chest in erect posture was done in every case and the presence or absence of free gas, under right dome of the diaphragm was recorded. A serum electrolyte was done in all cases. Routine haematological investigations, such as Hb%, total and differential count of WBC were done in all cases and serum amylase estimation of blood was done in some cases, where clinical diagnosis was in doubt.

Pre-Operative Measures

Immediately after admission in the ward all the patients were given intravenous fluid, nasogastric suction, antibiotics and tetanus toxoid injection. Blood samples were taken for grouping and cross-matching in case blood transfusion became necessary later on, especially in those cases, where a posterior ulcer sometimes bleeds in the immediate postoperative period. The conditions of the patients were reviewed carefully to see whether there has been any improvement during the pre-operative period. Shock, pulse, respiration, blood pressure, urine output and abdominal conditions were recorded frequently. To select the cases for definitive procedure, the following criteria were carefully assessed.

- 1) Good general state
- 2) Absence of shock or early recovery on resuscitative treatment
- 3) Short time interval between occurrence of perforation (<12 hours) and operation
- 4) Degree of peritoneal soiling at operation



Fig. 1: Chest X-Ray showing free gas under right dome of diaphragm

Operative Procedures

All patients was approached through supra umbilical midline incision. The repair of perforation was done by full thickness interrupted stiches with polyglactin suture (1-0) and was reinforced with omental on lay. In 11 cases selected for definitive procedure a vagotomy was performed. Among those 60 cases in 8 cases anterior gastro-jejunostomy was performed. Thorough peritoneal toileting done in every case with at least 4 litres of normal saline and abdominal tube drain was placed before closing with No-1 polypropylene.

Post-Operative Measures

Routine post-operative measures, as usual for cases of perforative peritonitis, were carried out (BP, pulse, temperature, urine output).

Special blood investigations like Hb%, TC, DC, ESR, Na+, K+, urea, creatinine, LFT with total protein and albumin carried out. Intravenous fluids and nasogastric suction were continued till the patient was ready for oral alimentation, as evidenced by decreasing aspirate, onset of peristalsis, passage of flatus or stool. The peritoneal drains were removed usually after instituting oral feeds and if the drainage amount was <20 ml in the last 24 hours. Post-operative complications were watched for and treated appropriately. The fate of the patient, i.e., survival or death was noted.

Pathological Investigations

In cases of gastric perforation, the specimen of mucosa obtained from the margins of the perforation was sent for histopathological

examination, while the peritoneal fluid from all cases was sent for bacteriological culture.

Follow-Up

In 49 cases where no definitive procedure was performed, H. pylori eradication therapy for 2 weeks followed by 4 weeks course of proton pump inhibitors (PPIs) was given. Each patient was asked to attend OPD at monthly (4weeks) interval or on recurrence of dyspeptic symptoms upto April 2018.

Results

The present clinical study of 60 cases of perforation peritonitis following peptic ulcer perforation in stomach & duodenum was carried out in the Medical College & Hospital, Kolkata, during the period of January 2017-October 2017. The total 60 cases of non-traumatic perforation peritonitis following peptic ulcer perforation in stomach & duodenum were admitted in different surgical wards in the hospital during the study period. The highest incidence was noted for duodenal ulcer perforation which accounts a total number of 52 patients 86.67% was of duodenal perforation and 8 patients 13.33% of the gastric perforation [Table 1].

Table 1: Aetiological incidence of perforation cases

Types of Perforation	Number of Perforation Case (%)	Percentage (%)
D.U. Perforation	52	86.67
Gastric Perforation	08	13.33

The highest incidence of gastroduodenal perforation was noted in the age group of 2nd - 5th decade of life. The majority of patients about 78% presented in the age group of 21-50 years [Table 2].

Table 2: Age incidence of peptic perforation cases

Age Group (Years)	Number of Cases	Percentage (%)
13-20	01	1.67
21-30	12	20
31-40	22	36.67
41-50	13	21.67
51-60	10	16.67
61-70	2	3.33
≥ 70	0	0
Total	60	100

In the present study the youngest was 15 years old and the oldest was found to be 62 years old. The present study started from the age group of 13 years old.

Table 3: Age incidence of gastric ulcer perforation cases

Age Group (Years)	Number of Cases	Percentage (%)
13-20	0	0
21-30	0	0
31-40	0	0
41-50	1	12.5
51-60	5	62.5
61-70	2	25
≥ 70	0	0
Total	8	100

From the table 3 above shown that gastric ulcer perforation was commonest (62.5%) in the (51-60) years age groups.

Table 4: Age incidence of duodenal ulcer perforation cases

Age Group (Years)	Number of Cases	Percentage (%)
13-20	1	1.92
21-30	12	23.07
31-40	22	42.3
41-50	12	23.07
51-60	5	9.61
61-70	0	0
≥ 70	0	0
Total	52	100

The table 4/fig. 2 shown that duodenal ulcer perforation was commonest (42.30%) in the (31-40) years age groups.

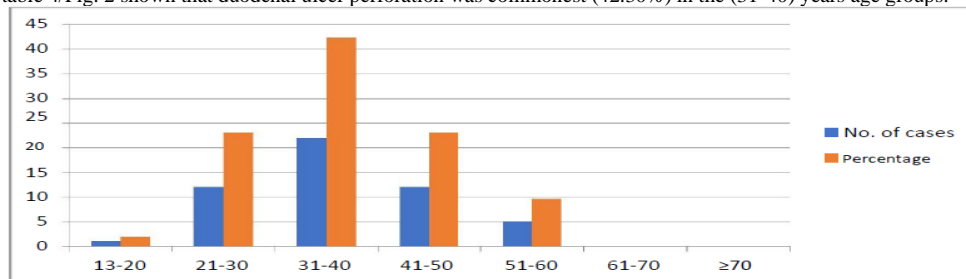


Fig. 2: Age incidence of duodenal ulcer perforation cases

In the present study of 60 patients out of there 51 male and 9 female cases were recorded. Male 85% and female 15% and male: female was 5.67:1.

Table 5: Sex Incidence in peptic Perforation

Sex	Number of Cases	Percentage (%)
Male	51	85
Female	09	15
Sex incidence in Gastric Perforation		
Male	7	87.5
Female	1	12.5

Symptoms and signs

Pain abdomen was the commonest symptom in all (100%) patients. The major symptoms, observed in 50 patients are put in the following table.

Table 6: Showing the different signs and symptoms of perforative peritonitis following peptic perforation in stomach and duodenum

Symptoms and signs	D. U. Perforation		Gastric Perforation	
	No.	%	No.	%
Pain Abdomen	52	100	8	100
Nausea & Vomiting	38	73.07	5	62.5
Abdominal Distension	36	69.23	3	37.5
Fever	30	57.69	2	25
Dehydration	46	88.46	6	75
Tenderness	52	100	8	100
Rigidity	47	90.38	6	75
Liver Dullness Obliteration	40	76.92	5	62.5
Paralytic Ileus	48	92.3	7	87.5
Digital Rectal Ex. Tenderness	16	30.76	1	12.50

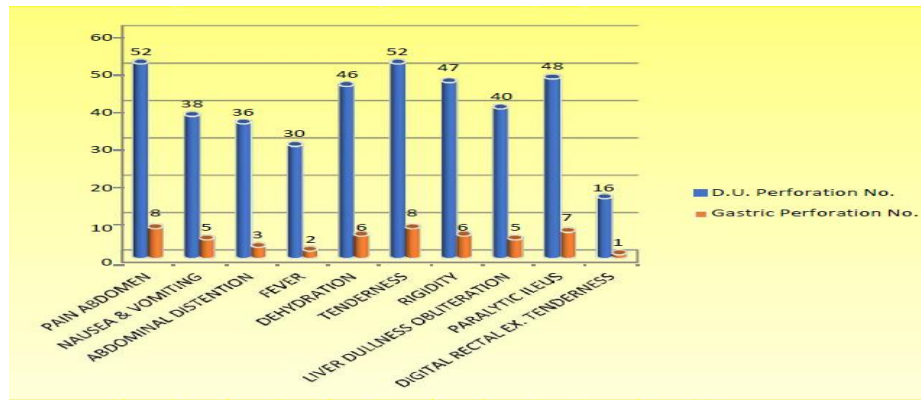


Fig. 3: Showing the different signs and symptoms of perforative peritonitis following peptic perforation in stomach and duodenum

Table 7: Site of duodenal and gastric ulcer perforation

Site of duodenal ulcer perforation	No. of Cases	Percentage (%)
Anterior Wall Of Duodenum (A)	46	88.46
Anterior Superior Aspect (ASA)	6	11.53
Posterior Wall (PW)	0	00
Total	52	100
Site of gastric ulcer perforation		
Lesser Curvature (LC)	1	12.5
Anterior Wall (AW)	7	87.5
Posterior Wall (PW)	0	0
Total	8	100

In the present study it was found that duodenal ulcer perforation was most common in the anterior wall (88.46%) of first part of duodenum and gastric ulcer perforation were along the anterior wall 87.5% [Table 7].

Discussion

The present clinical study of non-traumatic perforation peritonitis following peptic ulcer perforation in stomach & duodenum was carried out in Medical College & Hospital, Kolkata during the period commencing from January 2017 to October 2017.

Incidence of Perforation Peritonitis Following Peptic Ulcer Perforation in Stomach & Duodenum

In the present study of 60 cases of perforation peritonitis following peptic ulcer perforation in stomach & duodenum, the incidence of duodenal perforation was noted to be the commonest cause. The D.U. perforation was accounted 86.67% in the present series study in Medical College & Hospital, Kolkata. Gupta (1982) [12] reported 15%-33% overall incidence in India. In the most series studied in India and abroad peptic ulcer perforation was observed to be the commonest etiological cause of GIT perforation. The following table shows the relative incidence in percentage of different etiological causes in different series.

Table 8: Authors and their study for different perforation

Authors	Different Perforation	
	Duodenal Ulcer	Gastric Ulcer
M.K. Mitra (1966) [13]	33%	-
Desa et al (1983) [14]	32.29%	-
D.C. Rao (1984) [15]	43.4%	13%
Present Series (2017)	86.67%	13.33%

From the comparative study of different author, the present series of study has almost similarity with the findings of other authors.

country (Yadav, Srinarayan, 2002) [16] but contrast to western reports, where maximum reported age incidence was 60-70 years (Dawson, 1964) [17].

Age Variation

In the present study the maximum number of occurred in 2nd to 5th decade of life. This is comparable to the reports from the same

Table 9: Commonest age group of GIT perforations by various authors

Authors	Different Perforation	
	Duodenal Ulcer	Gastric Ulcer
Thompson JC (1960) [18]	21-30	21-30
Krag E (1966) [19]	21-30	21-30
Watkins RM (1984) [20]	21-30	21-30
Levin DC (2008) [21]	21-40	21-40
Present Series (2017)	15-60	41-70

Sex Incidence

The present study recorded total 60 cases out of which 51 male (85%) and 9 female (15%) cases. The male to female ratio was 5.67:1. This result is comparable to the report of other developing

country (Ahmad et al, 1975) [22]. But this is in contrast to the experience from the western world (USA) where female out number males (Peoples JB, 1986) [23].

Table 10: Male to female percentage as reported by various author

Author	Male (%)	Female (%)	Ratio (M:F)
M.K. Mitra (1966) [13]	100	-	-
Watkins RM (1984) [20]	96	4	24:1
Desa et al (1983) [14]	79	21	3.8:1
Ahmed et al (1991) [22]	88	12	7.8:1
Dev et al (1994) [24]	81	19	4.25:1
Arnaud JP et al (2003) [25]	80	20	4:1
Present Series (2017)	85	15	5.67:1

Clinical Features

Pain: In the present series of study pain abdomen was the principal symptom in all cases. Location of the pain varied with the type and site of perforation. All 60 cases of perforation (100%) found pain abdomen in the present series. Pain abdomen is also the chief complaints in other study and comparison is shown in the table below.

Table 11: Pain abdomen and related study

Author	Year	Pain Abdomen %
De Bakey [26]	1940	85
Rao SS [15]	1983	98
Desa, S [14]	1984	100
Present Series	2017	100

Nausea and Vomiting

Vomiting was found in 71.67 % of the cases. Waston (1930) [27] described and vomiting as the presenting symptoms in majority of peptic ulcer perforation cases. The comparative studies with the different authors are given in the table below.

Table 12: comparative studies with the different authors

Author	Year	Nausea & Vomiting %
De Bakey [26]	1940	45
Desa, S [14]	1984	53
Present Series	2017	71.67

Fever

In the early cases of perforation, fever is not usually associated but as the time progresses and patient starts developing 2nd stage of peritonitis the temperature rises to higher degree. In the present study of 60 cases, Patients with peptic ulcer perforation had less occurrence of fever. The overall 53.33 % cases were found associated with fever. De Bakey (1940) [26] found in 50 % cases with fever, M.K. Mitra (1966) [13] found in 44 % cases and Desa's (1984) [14] found in 44 % of cases.

Abdominal Distension

Abdominal distension is frequent association in the initial stage of all types of perforation. In the present series of study abdominal distension was associated with 69.23% cases of duodenal ulcer perforation. In gastric ulcer perforation were found 37.5%. M.K. Mitra (1966) [13] found 50 % cases and Desa's (1984) [14] found in 64% of cases associated with abdominal distension.

Dehydration

Dehydration was more pronounced in cases of upper perforative peritonitis. In the present series dehydration was more pronounced with peptic ulcer perforation in 86.67% of cases. The comparative incidences with different series are given below.

Table 13: Dehydration related study

Author	Year	Dehydration %
De Bakey [26]	1940	65
Desa, S [14]	1984	70
Present Series	2017	86.67

Guarding and Rigidity

Guarding and rigidity were found in 90.38% cases of DU perforation and 75% cases of GU perforation. The comparative incidences with different series are given below.

Table 14: Rigidity related study

Author	Year	Rigidity %
De Bakey [26]	1940	87
Desa, S [14]	1984	85
Present Series	2017	90.38

Tenderness

In the present series of 60 cases abdominal tenderness was present in 100% cases of gastro duodenal ulcer perforation. Over all 100% of cases were associated with abdominal tenderness.

Obliteration of Liver Dullness

In the present series of 60 cases liver dullness obliteration were found in 45 cases 75%. Table has been showing comparative study by different authors.

Table 15: Tenderness and Obliteration of Liver Dullness related study

Author	Tenderness (%)	Liver Dullness Obliteration %
De Bakey [26]	95	49
Desa, S [14]	85	50
Present Series	100	75

Paralytic Ileus

In the present series of study absent of bowel sound was present in 55 cases out of 60 cases 91.67% patient had absent bowel sound.

Per Rectal Tenders

Per rectal digital examination was performed in all 60 cases. Per rectal tenderness was in 28.33% of cases. Desa's (1984) [14] in his study found 16.7% cases with per rectal tenderness. In our study the patients generally comes late to the hospital which may be the reason of higher of rectal tenderness.

Hemoglobin

In 16% cases the hemoglobin level was below 70%, poor nutritional preexisting anemia can be justified. Leucocytosis in a range of 10,000 to 20,000/cumm is noticed in maximum number of cases.

Radiological Investigation

In the present study abdomen and chest x-ray in erect posture were done in all 60 cases. Pneumoperitoneum was detected in 91.67 % of patients.

Table 16: Presence of gas under the diaphragm (radiological) in different series

Author	Year	Gas under the diaphragm %
De Bakey [26]	1940	64.6
Ghosh [27]	1971	98
R. Greco [29]	1974	92
Dev AK [24]	1994	71
Present Series	2017	91.67

Conclusion

Generalized peritonitis is a lethal condition and has a high mortality rate and morbidity. Peptic ulcer perforation contributes one of the most frequent causes of peritonitis. Excellent knowledge gained in the field of physiological derangement in fluid and electrolyte balance and haemodynamics have added much towards the understanding of different pathological process with related symptomatology of various conditions of generalized peritonitis following perforation and have prepared the path for a rational approach to the management of acute abdominal condition. Emergency Laparotomy is a major test for skill of the surgeon in acute abdomen. A proper history and physical examination aided by radiological examination like plain X-ray of abdomen in erect posture and X-ray chest in erect posture help in arriving at an easily accurate diagnosis and proper management. Interval between perforation and repair is very important and is often life saving.

References

1. John H. Primarose stomach and duodenum Bailey and Love's text book of surgery 24th edition, Pg 1036-1060.

2. Svanes C. Trends in perforated peptic ulcer: incidence, etiology, treatment, and prognosis. World J Surg. 2000 Mar;24(3):277-83.
3. Dayal Yogeshwar, et al. The gastrointestinal tract, Robin's pathologic basis of diseases 6th edition; 830-925.
4. Ng EKW, Chung SCS, Sung JJY, Lam YH, Lee DW, Lau JY, Ling TK, Lau WY, Li AK. High prevalence of Helicobacter pylori infection in duodenal ulcer perforations not caused by non-steroidal anti-inflammatory drugs. Br J Surg. 1996 Dec;83(12):1779-81.
5. Sebastian M, Premchandran VP, Elashaal YIM, Sim AJ. Helicobacter pylori infection in perforated peptic ulcer disease. Br J Surg. 1995 Mar;82(3):360-2.
6. Reinbach DH, Cruickshank G, McColl KEL. Acute perforated duodenal ulcer is not associated with Helicobacter pylori infection. Gut. 1993 Oct;34(10):1344-7.
7. David W. Merich, et al; stomach, Sabiston text book of Surgery 18th edition 2008 1270-1350.
8. Del Valle J. Text book of gastroenterology. Philadelphia: Lippincott Williams & Wilkins. 2003.

9. Sonnenberg A. Peptic ulcer. In: Everhart JE, National Digestive Diseases Data Working Group (US), and National Institute of Diabetes and Kidney diseases (US), editors. *Digestive Diseases in the United States: epidemiology and impact*. Bethesda: US dept. of Health and Human Services Public Health Service National Institutes of Health. 1994.
10. Palmer KR, et al. *Diseases of the alimentary tract and pancreas, Davidson's text book of Medicine 18th edition 2004*; 1026-1061.
11. Isselbacher J Kunt, et al. Peptic ulcer, *Harrisons. Principle of Internal Medicine, 14th edition* 284; 15:1609.
12. Gupta AK, Drummond-Main C. Meta-analysis of randomized, controlled trials comparing particular doses of griseofulvin and terbinafine for the treatment of tinea capitis. *Pediatr Dermatol*. 2013 Jan-Feb;30(1):1-6.
13. Mitra MK, Krag E. Long term prognosis in medically treated peptic ulcer. *Acta Med Scand* 1966; 180:657.
14. Desa LA, Mehta SJ, Nadkarni KM, Bhalerao RA. Peritonitis: A study of factors contributing to mortality. *Ind J Surg* 1983; 45:593-604.
15. Rao SS, Murthy KV. Post-bulbar and coexisting ulceration: unique features of peptic ulcer in Hyderabad. *Gut*. 1993;34(10):1327-1330.
16. Yadav SS, Srinarayan. An experience with cases of peritonitis at Bheri Zonal hospital, Nepalgunj. *J Soc Surg Nepal* 2002;5:33-6.
17. Dawson JL. Peptic ulcer: surgical treatment. *Br Med J*. 1969 Oct 11;4(5675):102-5. doi: 10.1136/bmj.4.5675.102. PMID: 5823037; PMCID: PMC1629489.
18. Thompson JC, peskin GW. The clinical significance of the gastric antrum. *Surg Clin North Am*. 1960 Dec;40:1521-37. PMID: 13776581.
19. Krag E. Long-term prognosis in medically treated peptic ulcer. A clinical, radiographical and statistical follow-up study. *Acta Med Scand*. 1966 Dec;180(6):657-70.
20. Watkins RM, Dennison AR, Collin J. What has happened to perforated peptic ulcer? *Br J Surg*. 1984 Oct;71(10):774-6.
21. Levin DC, Rao VM, Parker L, Frangos AJ, Sunshine JH. Ownership or leasing of CT scanners by nonradiologist physicians: a rapidly growing trend that raises concern about self-referral. *J Am Coll Radiol*. 2008 Dec;5(12):1206-9.
22. Ahmed W, Qureshi H, Alam SE, Zuberi SJ. Perforated duodenal ulcer--a long term follow-up. *J Pak Med Assoc*. 1990 Nov;40(11):258-9. PMID: 2126806.
23. Peoples JB. Candida and perforated peptic ulcers. *Surgery*. 1986 Oct;100(4):758-64. Erratum in: *Surgery* 1988 Feb;103(2):270. PMID: 3764698.
24. Dev AK, Paul S, Bhatta N, Roy Choudhury J : Perforated duodenal ulcer. *Ind J Surg* 1994; 56(5):222-227.
25. Arnaud JP, Tuech JJ, Bergamaschi R, et al. Laparoscopic suture closure of perforated duodenal peptic ulcer. *Surg Laparosc Endosc Percutan Tech*. 2002;12:145-7.
26. Debakey M. Acute perforated gastroduodenal ulceration *Surgery* 1940;8; 852-884 & 1028-1076.
27. Watson John H. A Paper On Acute Perforating Duodenal And Gastric Ulcers. *The British Medical Journal* 1930; 2(3630): 169-173. JSTOR, www.jstor.org/stable/25336878. Accessed 12 Mar. 2021.
28. Ghose NK. Acute perforation of peptic ulcer. *J Indian Med Assoc*. 1971 May 16;56(10):304-9. PMID: 5093789.
29. Greco RS, Cahow CE. Alternatives in the management of acute perforated duodenal ulcer. *Am J Surg*. 1974 Jan;127(1):109-14. doi: 10.1016/0002-9610(74)90019-1. PMID: 4808682.

Conflict of Interest: Nil

Source of support: Nil