

Surgical audit of peptic perforation among Scheduled Tribe patients attending Bankura Sammilani Medical College and Hospital, India

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Abstract: Despite medical advances, duodenal ulcer perforation remains a surgical emergency. A prospective observational study was conducted from January 2013 to October 2014 involving 100 Tribal patients with suspected perforated peptic ulcer (PPU) admitted in department of Surgery, Bankura Sammilani Medical College & Hospital (BSMCH) aiming to assess preoperative risk factors and find out therapeutic outcome with its determinants. Data were collected via interview, clinical examination and necessary investigations using predesigned proforma. Maximum (47.0%) patients belonged to 40-60 years age group with 10.1: 1 male- female ratio. One third, 69% and 36% participants were addicted to alcohol, tobacco smoking and using NSAID, respectively. One fourth (26%) had one or more co-morbidities. Around one third attended BSMCH after one day of onset of symptoms. On admission, pain/tenderness and free fluid in abdomen and gas under diaphragm were almost universal. Obliterated liver dullness, muscle rigidity, diarrhea/ constipation/distention and dehydration were present in more than 2/3rd of patients. Ten percent had high Boey's score. Majority (46%) of perforation was in range of 0.5cm to 1.0cm. Ninety four and three percent were treated by Graham omental patch surgery and conservative management. Lung infection was the commonest post-operative complication suffered by 35%. Overall mortality was 3.0% and found higher among patients aged ≥ 60 years, managed conservatively, had co-morbidities, sustained larger ulcer size with higher Boey's score and underwent surgical methods other than Graham's omental repair. The study results would help treating physicians in choosing therapy and in preventing acid peptic disease by reducing risk factors.

Key-words: perforated-peptic-ulcer, tobacco smoking, non-steroidal anti-inflammatory drugs, omental patch repair, conservative management

Date of Submission: 20-05-2018

Date of acceptance: 04-06-2018

I. Introduction

Duodenal ulcer is a common condition characterized by the presence of a well-demarcated break in the mucosa that may extend into the muscularis propria of the duodenum. Despite better understanding of pathophysiology and tremendous advances in medical therapy of acid peptic disease, duodenal ulcer perforation remains one of the major causes of peritonitis.^{1,2} The incidence of perforated peptic ulcer in western countries is 7 to 9 per 1, 00,000 population per year.³⁻⁵ The incidence of perforation of duodenal ulcers in young and middle aged patients appears to be falling but in contrast, there is currently a marked increase in the numbers of elderly patients. Perforation peritonitis is the most common surgical emergency in India, and duodenal ulcer perforation remains the leading cause.^{1,2} Non-operative treatment of perforated peptic ulcer is associated with a very high incidence of mortality and has no role in the management of this serious life-threatening condition. Patient generally presents with acute abdominal pain and once the diagnosis is confirmed, emergency laparotomy should be performed.⁶⁻⁹ Conservative management is reserved for those who cannot withstand stress of surgery.¹⁰ Closure of the perforation with omental patch followed by eradication of *Helicobacter pylori* (HP) is accepted worldwide.¹¹ Bankura Sammilani Medical College and Hospital (BSMCH), one of the peripheral medical colleges of West Bengal, India caters huge patients majority of which belongs to tribal communities with lower socioeconomic status and living in remote area, having addiction to tobacco and alcohol, pursuing poor care seeking behaviour. Peptic ulcer disease (PUD) is likely to be common among this

section of people and there is scarcity of data regarding the characteristic features of PUD leading to perforated peptic ulcer (PUP) and the factors influencing its outcomes. With this back drop the present study was contemplated.

Research question: What are the characteristics of PPU, outcome of PPU and its correlates among the tribal patients?

Objective:

- To assess preoperative risk factors and co-morbidity among the patients with PPU
- To find out the therapeutic outcomes of PPU
- To determine the factors influencing outcome of PPU

II. Material and Methods:

A descriptive follow up study was conducted from January 2013 to October 2014 involving all Tribal patients with suspected PPU admitted in In-Patients-Department (IPD) of General Surgery, BSMCH. One hundred such patients willing to participate were included in study. After obtaining clearance from Ethics Committee, BSMCH and informed consent of participants, data were collected via interview, clinical examination, record review and both laboratory as well as radiological/sonological investigations using predesigned proforma. Information suggestive of acid peptic disease, smoking, alcohol consumption, using non-steroidal anti-inflammatory drugs (NSAID), associated medical diseases was noted. The presenting clinical features were recorded. Treatment delay was duly estimated. Diagnosis was made on the basis of clinical presentation and radiological findings e.g. presence of free gas under diaphragm in erect chest radiograph and free fluid in abdomen on ultra sonogram (USG). Boey's score was calculated from three points –major medical illness, preoperative shocks, and long standing perforation, each having value of 1. Routine management, monitoring and pre-anesthetic check up were arranged for all the patients. Laparotomy was done under general anesthesia with supra-umbilical midline incision. Intra-operative findings of peritoneal spillage with bile stained fluid, location and size of perforation, fibrinous exudates with surrounding tissue edema, were given due importance. Peritoneal toileting was done and perforation was closed by interrupted sutures by 2-0 vicryl and reinforcing the site of perforation by Graham's pedicled omental patch. Abdominal closure was done after placing intra-abdominal drain. Post operative morbidity, mortality and hospital stay were assessed. Patients were discharged within 14 days putting them on triple regimen for two weeks for eradication of HP and with advice to avoid risk factors for PUD. These patients were followed up weekly for four weeks.

III. Results:

Maximum (47.0%) patients belonged to age group of 40-60 years closely followed by 20-40 years group which contributed 43.0%. Male- Female Ratio was 10.1: 1. [Table-1]

Table-1: Distribution of patients as per age and sex (N=100)

Age (yrs)	Male No. (%)	Female No. (%)	Total No. (%)
Up to 20	3(100)	-	3(100)
20 to 40	41(95.3)	2(4.7)	43(100)
40 to 60	41(87.2)	6(12.8)	47(100)
≥60	6(85.7)	1(14.3)	7 (100)
Total	91(91.0)	9(9.0)	100(100)
Average	42.46	47.89	42.95

History of haematemesis/malaena could be explored only from 4% of participants. Majority (89%) of patients belonged to below poverty level of socioeconomic status. In regard to addiction, it was found that 69% reported tobacco smoking, 33% participants were addicted to alcohol consumption and 32% had addiction to both. [Multiple responses] History of NSAID and /or steroid use was reported by 36% of respondents. About one fourth (26%) of participants was reportedly having co-morbidity viz- chronic obstructive pulmonary disease (COPD), hypertension (HTN), COPD+HTN and COPD+diabetes mellitus (DM) among 18%, 4%, 3% and 1%, respectively. Family history of PUD was given by 9% and history of previous ulcer disease or dyspepsia was explored from 16% of participants. Episodes of arthritis were reported by 7% of participants.

One fourth of the study subjects were revealed to report to the doctor within 12 hours after onset of symptoms. Another 42.0% attended between 12 to 24 hours. However, around one third was found to attend to BSMCH after one day after onset of their symptoms. [Table-2]

Table-2: Distribution of patients according to the time interval between first symptom and admission. (N=100)

Interval (hr)	Male	Female	Total
	No. (%)	No. (%)	No. (%)
0 to 12	23 (25.3)	2(22.2)	25(25.0)
12 to 24	39(42.9)	3(33.3)	42(42.0)
24 to 36	23(25.3)	4(44.4)	27(27.0)
≥36	6(6.6)	-	6(6.0)
Total	91(100)	9(100)	100(100)
Average	20.45	22.33	20.62

Peritoneal sign was found to be present at the time of admission in BSMCH among 98% of patients. Overall, 27% (27.5% male and 22.2% female) had tachycardia i.e. pulse rate more than 100/minute and overall 11.0% patients was revealed to have SBP <90 mm of Hg (hypotension).

At the time of admission, pain abdomen and abdominal tenderness was universal. Obliterated liver dullness, muscle rigidity, dehydration and diarrhea/constipation/distention were presented by more than 2/3rd of the patients. [Table-3]

Table-3: Distribution of patients according to their presenting clinical features (N=100)

Clinical features		Number of patients	Percent
Symptoms	Pain	100	100
	Distension	79	79
	Constipation/diarrhea	79	79
Signs	Abdominal tenderness	100	100
	Obliterated liver dullness	98	98
	Muscle guarding/rigidity	91	91
	Dehydration	83	83
	Nausea and vomiting	49	49

Gas under diaphragm in x-ray and free fluid was detected in USG among 98% and 96% participants. One in every ten patients had a high Boey's score i.e. 3. [Fig.1]

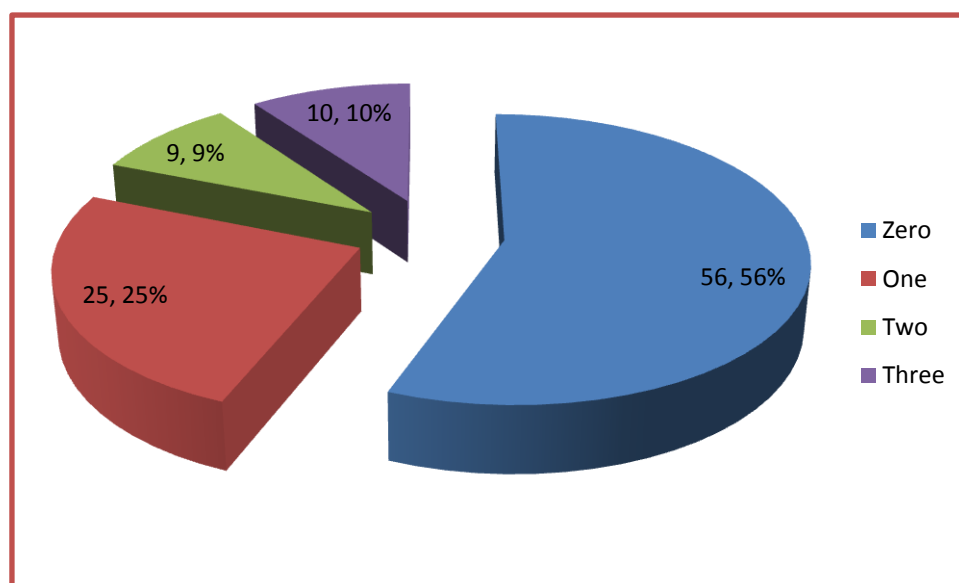


Fig.1: Distribution of patients according to their Boey's score

Regarding therapeutic option, 97% and 3.0% patients were treated by surgical intervention and conservative management, respectively. The mean time for surgical intervention after admission was 1.72 hours. Majority (46%) of perforation was in the range of 0.5cm to 1.0cm followed by <0.5cm among 31%, from 1.0 cm to 2.5cm among 17% and ≥2.5cm for 3% of cases. Average size of perforation was estimated to be 0.8 cm.

Almost all (96%) were duodenal perforations and few were stomach ulcers and 96% of ulcers were on anterior site.

Out of those managed surgically, 94%, 2.0% and 1.0% were treated by Graham’s patch, Partial gastrectomy and gastrojejunostomy, respectively.

So, far as the post-operative follow up findings concerned, 48 (49.5%) patients had tachycardia on day 1 compared to none on day 3 of post-operative period. Analysis also revealed that 40.21% vs 52.58% and 29.89% vs 3.09% of patients underwent surgery were found experiencing mild and moderate to high rise of temperature on the 1st and 3rd postoperative day, respectively. More than 50ml drain collection was found in 23.7% of patients even on 3rd post-operative day. [Table-4]

Table-4: Distribution of patients as per amount of post operative drain collection (ml). (n=97)

Drain collection (ml)	Number of patients (%)	
	Day1	Day3
<50	-	74 (76.29)
50-100	26(26.80)	21(21.65)
100-150	43(44.33)	1(1.03)
≥150	28(28.87)	1(1.03)

It was observed that status of surgical wound on day 3 of post-operative follow up was healthy in case of 92.78% of patients. Majority of patients (58%) were asymptomatic, however, 42% suffered from other post-operative complications. Lung infection was the commonest post-operative complication, observed in 35% of patients treated by operation. [Fig. 2]

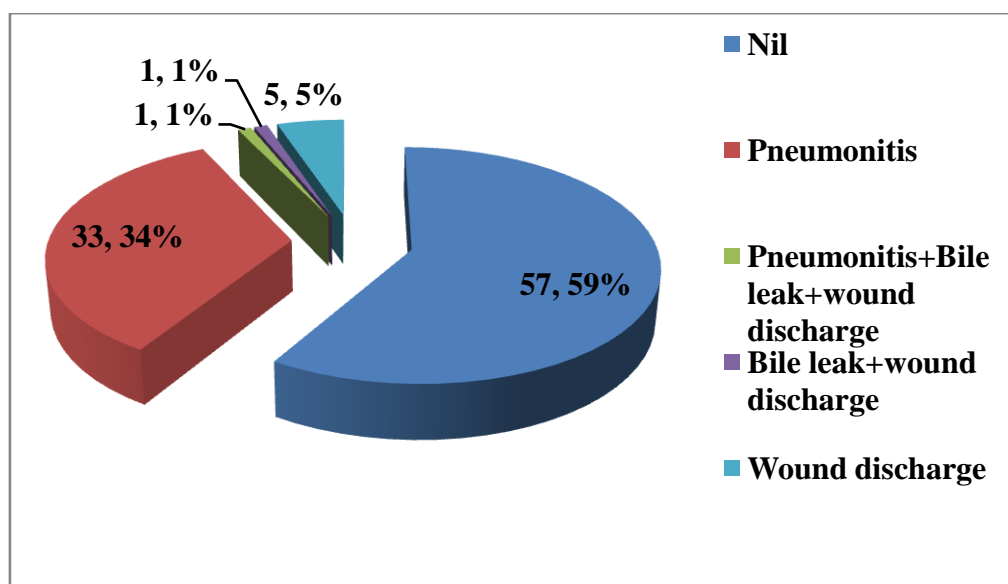


Fig.2: Distribution of patients as per their post-operative complications

Average time taken to return of intestinal peristalsis sound (IPS) in this study was 32.68 hours. In 82 cases (84.5%) IPS returns within 48 hours. Only 6 (6.2%) cases it was found to return beyond 48 hours. [Fig.3]

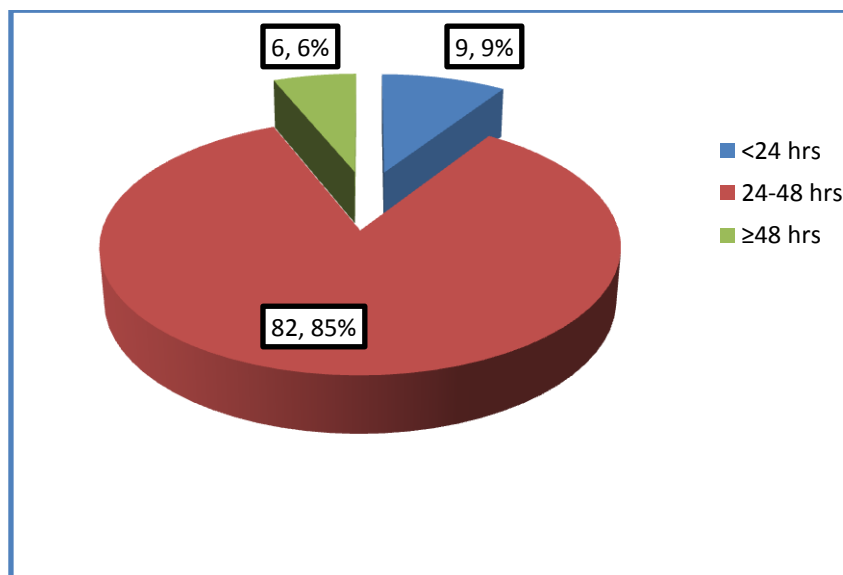


Fig.3: Distribution of participants according to the time interval for returning of IPS

Overall mortality was 3.0% in this study, two i.e. 66.67% (4.2% of the group) in 40-60 years age group and one i.e. 33.33% (14.2% of the group) in 60 years and above age group. Mortality was found to be higher among patients managed conservatively, who had co-morbidities, sustained larger ulcer size with higher Boey's score and underwent surgical methods other than Graham's omental patch repair. [Table-5]

Table-5: Distribution of patients according to mortality and influencing factors

Variables	Size of perforation	No. of patient	Mortality	Percentage
Perforation	<0.5	31	0	-
	From 0.5 up to 1	46	0	-
	From 1 up to 2.5	17	0	-
	≥2.5	03	2	66.6
Co-morbid condition	Present	26	3	11.5
	Absent	74	0	-
Boey's score	0	56	0	-
	1	25	0	-
	2	09	0	-
	3	10	3	30
Mode of treatment	Operative	97	2	2.06
	Conservative	03	1	33.3
Mode of operation (n=97)	Closure by Graham's patch	94	1	1.06
	Other operative methods	03	1	33.3

Average hospital stay was estimated to be 10.97 days. Out of successfully treated 97 patients, about 80% returned for regular follow up to four weeks of post-operative period and 92.3% of them were found to be asymptomatic. However, 7.7% had some minor complaints.

IV. Discussion

In this study, male female ratio was 10.1:1 which corresponded with results of other studies in India.¹²⁻¹⁴ PUD is more common in male probably due to greater acid secretion in male than in female or because of more stress and increased indulgence in smoking/alcohol by male. However, there are studies which reported different male female ratio due to increased incidence of perforated peptic ulcer in female.^{7, 12}

Analysis revealed that average age was 42.95 years, majority (47%) of patients was in age group of 40 to 60 years and 43% patients were in 20 to 40 years age group. These findings have concordance with observation made by many other studies.^{3, 9, 12, 13, 15-17}

Overall, average time lapse between first symptom and admission was 20.62 hours. In male and female it was 20.45 and 22.33 hours, respectively. The overall time interval has concurrence with study conducted by Kenneth R S et al.¹⁸ However, few other studies reported a bit different time interval.^{16, 19, 20}

Analysis showed that 33% cases were admitted after 24 hours and all three patients who died belonged to this group. It reinforced the observation made by Etoneyaku A C et al. in their study that delay in treatment is one of the strong determinants of lethality, complication, and prolonged hospital stay.²¹ More than 24 hours

delay increases morbidity and mortality as also observed in other studies.^{3,18,19,22} Present study revealed that causes of delayed coming to hospital were mainly lack of transport service, unawareness of seriousness and indulgences of quacks in management of such patients in villages. Delay might be because patients took medication in pre-hospital period with hope that symptom would abate. It was also possible that the clinician managing the patient initially might not have considered perforation as a possible diagnosis.

The mean time for surgical intervention after admission in this study was 1.72 hours similar to a finding reported by Surapaneni S et al.²³ Based on results of their study, Jae-Myung K et al. opined that time interval between admission and operation is an important mortality indicator in peptic ulcer perforation.²⁴

Around 2/3rd (69%), one third (33%) participant reported consumption of tobacco and alcohol, respectively, along with 36% using NSAID and/or steroid, all are major risk factors of PUD.^{11,14,25} The reason for non-reduction in incidence of PPU in spite of overall declined incidence of PUD might be increase use of NSAID which has been found to be the most common cause of PUD among patients who test negative for HP.^{14,26}

The finding that 98% patients had x-ray features suggestive of free gas under diaphragm had concurrence with what was showed by Nuhu A et al. and Gunshefski L et al. in their studies which reported this figure in the range of 85-90%.^{8,16}

One third mortality in conservatively treated group was considered higher compared to results of other studies.^{10,13,27} However, from their study Svanes C et al. reported mortality as high as 42.3%.²⁰ Conclusion of different studies suggests that mortality in conservatively treated patients corresponds with that of surgically treated patients if appropriate selection of patient is done.¹³

Duodenal perforation and gastric perforation ratio was calculated to be 23.3:1. Other studies concluded that duodenal perforation is more common than gastric perforation with variation in duodenal and gastric ulcer perforation ratio.^{4,7,11,17,28} However, in a study conducted at Muhimbili National Hospital in Tanzania Ngerageza J G reported a ratio of gastric to duodenal perforation of 2.5:1 among cases while the ratio of gastric to duodenal ulcer was 1:1 among control.¹⁴

In 96 (98.97%) cases perforation were located anterior and in one (1.03%) case it was located posterior. Around 97% of patients in this study were treated with simple closure with Graham's omental patch which is safe and still the commonest operation done worldwide.^{4,6-9,11,14,18,21,25} Out of those patients treated with Graham's omental patch technique one died yielding a mortality rate of 1.1%. Three patients were treated by surgery other than omental patch technique (two by partial gastrectomy with gastrojejunostomy and one with gastrojejunostomy) with death of one i.e. 33.3%. No laparoscopic closure of the perforation was performed in this study though Laparoscopic repair of PPU is an amenable and feasible technique in the hands of experienced laparoscopic surgeon when cases are diagnosed properly in early stage.^{29,30}

However, shock, delayed presentation (more than 24 hours), confounding medical conditions, age more than 70 years, American society of anaesthesiology III – IV degrees and high Boey's score – all should be considered as risk factors for laparoscopic repair. Inadequate ulcer localization, large perforation size (more than 6 mm diameter according to one's, more than 10 mm diameter according to others) and ulcer with friable edges are laparoscopic risk as well and all are indicators of open repair.³¹

As highlighted in present study 56%, 25%, 9% and 10% patients were found having Boey's score of zero, one, two and three, respectively with 30% death in the group which had highest grade of Boey's score. From their study, Boey J et al. reported increasing mortality trend with increase in Boey's score e. g. mortality rate of zero, 10%, 45.5% and 100% in patient with Boey's score of zero, one, two and three, respectively.³²

During laparotomy, diameter of perforation was found to be ≥ 2.5 cm in three cases and two of them died. From observation of their study, Kumar K et al. concluded that size of perforation is one of the factors contributing to re-leak after surgical closure of PPU.³³

Analysis reflected that post operative complication rate was 41.2% and it was higher than that reported by other studies.^{4,9,13,17,20,27,31,33,34} Pneumonitis was revealed to be the predominant post-operative complication experienced by 34 (85%) out of 40 patients developed any sorts of post-operative complications. This incidence was much higher compared to the findings of other studies and might be due to co-existing lung disease among the elderly smokers as reported by Gujar N et al.⁹ All four patients who needed to be shifted in intensive care unit (ICU) were in the age group of more than 50 years and also had COPD, attended this hospital beyond 24 hours with poor general condition. Two out of them died on 5th postoperative day.

Mortality rate among gastric and duodenal perforation in this study were 25% and 1.07%. Other studies also showed higher mortality in stomach perforation.^{3,19}

Only two patients (2.1%) had bile leak as post-operative complication detected on 3rd post-operative day. Both of the patients died on 5th day as complication of septicemia. Simple closure with Graham's omental patch was conducted in one case for duodenal perforation of diameter 2.2 cm and partial gastrectomy with gastrojejunostomy were conducted for the other case having posterior stomach perforation of size of 3 cm.

Studies reported that size of the perforation is also one of the factor contributing to re-leak along with age, pulse rate, systolic BP, haemoglobin level, general condition of the patient, serum total protein/albumin ratio.^{6, 33}

Altogether 26% patients had one or more co-morbid conditions like hypertension/ diabetes/COPD and out of that 22 (84.6%) were suffering from COPD. Preoperative co-morbid condition is important risk factor for morbidity and mortality.^{4, 6, 20, 22, 24, 31, 32, 35}

The average time for the return of IPS in this study group was 32.68 hours. Amongst 85% of 97 cases treated operatively, return of IPS occurred between 25 to 48 hours. Six cases (6.2%) were found to have delayed return of IPS. All these six patients were found to have age more than 50 years and attended delayed in the hospital. Arveen S et al. observed in their study that in 93.9% patients IPS returned within 48 hours.³⁶

The overall mortality in the present study was 3.0% with 33.3% among conservatively treated group and only 2.06% in operatively treated group. The mortality rates were found to vary across the studies.^{16, 20, 22, 27, 31, 35}

V. Conclusion:

Peptic perforation is a surgical emergency more common in male from lower socio-economic group. Anterior duodenum was the commonest site of perforation with peak of incidence in fifth decade of life. Patients with gastric perforation were older than patients with pyloro-duodenal perforation with greater mortality. Simple closure with Graham's omental patch is safe and commonest operative procedure. Advanced age, addiction to alcohol/ smoking, using NSAID, treatment delay, co-morbidity and high Boey's score were associated with increased morbidity and mortality of the patients. The findings of the study may be helpful to the care givers for planning therapeutic intervention. Grass root level workers can play a vital role via addressing modifiable risk factors like addiction to smoking/alcohol, misuse of NSAID, reporting time interval.

References:

- [1]. Carlos VR Brown, George C Velmahos. The consequences of obesity on trauma, emergency surgery, and surgical critical care. *World Journal of Emergency Surgery* 2006; 1:27. doi:10.1186/1749-7922-1-27.
- [2]. Yadav D, Garg P K. Spectrum of Perforation Peritonitis in Delhi: 77 Cases Experience. *Indian J Surg.* 2013;75(2):133-7
- [3]. Cohen M M. Treatment and Mortality of Perforated Peptic Ulcer: A Survey of 852 Cases. *Can Med Assoc J.*1971; 105(3): 263-269, 282.
- [4]. Dakubo JC, Naaeder SB, Clegg-Lamptey JN. Gastro-duodenal peptic ulcer perforation. *East Afr Med J.* 2009; 86(3):100-9
- [5]. Cherian JV, Somasundaram A, Ramalingam S, Jayanthi V. Peptic ulcer disease in India--a 16 year trend analysis. *Trop Gastroenterol.* 2010;31(4):260-5
- [6]. Gupta S, Kaushik R, Sharma R, Attri A. The management of large perforations of duodenal ulcers. *BMC Surgery*2005; 5:15. <https://doi.org/10.1186/1471-2482-5-15>
- [7]. Bin-Taleb AK, Razzaq RA, Al-Kathiri ZO. Management of perforated peptic ulcer in patients at a teaching hospital. *Saudi Med J.* 2008; 29(2):245-50
- [8]. Nuhu A, Kassama Y. Experience with acute perforated duodenal ulcer in a West African population. *Niger J Med.* 2008; 17(4):403-6.
- [9]. Gujar N, Awati J, Mudhol S, Contractor S, Choudhari R, Garag S. Immediate Results of Omentopexy in Perforated Duodenal Ulcer: A Study of 186 Cases. *Al Ame en J Med Sci* 2012; 5(1):29-38.
- [10]. Hanumanthappa M B, Gopinathan S, Guruprasad R D, Neil D A. A Non-operative Treatment of Perforated Peptic Ulcer: A Prospective Study with 50 Cases. *Journal of Clinical and Diagnostic Research* 2012; 6(4):696-9.
- [11]. Phillippo L C, Joseph B M, Mheta K, Mabula D Mchembe, Hyasinta M J, Rodrick K et al. Clinical profile and outcome of surgical treatment of perforated peptic ulcers in Northwestern Tanzania: A tertiary hospital experience. *World J Emerg Surg.* 2011; 6:31. doi: 10.1186/1749-7922-6-31
- [12]. Cohen MM. Perforated peptic ulcer in the Vancouver area: a survey of 852 cases. *Can med association J* 1971; 104 (3):201-5.
- [13]. Rahuman MM, Saha AK, Rahim A. Experience of peptic ulcer perforation over a decade in a teaching hospital of southern Bangladesh. *Ceylon Med J.*2003; 48(2):53-5.
- [14]. Ngerageza J G. Factors associated with peptic gastroduodenal ulcer perforations in adult patients at Muhimbili National Hospital. Dissertation submitted of master of medicine in general surgery of Muhimbili University of Health and Allied Sciences. Available at: <http://ihi.eprints.org/1021/1/muhas18.pdf>, last accessed on 31.12.2014
- [15]. Skarstein A, Hoisaeter PA. Perforated peptic ulcer: a comparison of long term results following partial gastric resection or simple closure. *Br J Surg.* 1976; 63 (9): 700-3.
- [16]. Gunsheski L, Flancaum L, Brolin RE, Frankel A. Changing patterns in perforated peptic ulcer disease. *Am Surg.* 1990; 56(4):270-4.
- [17]. Siu WT, Chau CH, Law BK, Tang CN, Ha PY, Li MK. Routine use of laparoscopic repair for perforated peptic ulcer. *Br J Surg.* 2004; 91(4):481-4.
- [18]. Kenneth R S, Barry A L, Wayne H S, Bradley J A. Simple Closure of Perforated Peptic Ulcer Still an Effective Procedure for Patients With Delay in Treatment. *Arch Surg.* 1981; 116(5):591-596. doi:10.1001/archsurg.1981.01380170071012
- [19]. Svanes C, Lie RT, Svanes K, Lie SA, Søreide O. Adverse effects of delayed treatment for perforated peptic ulcer. *Ann. surg.* 1994; 220(2):168-75
- [20]. Svanes C, Salvesen H, Espehaug B, Søreide O, Svanes K. A multifactorial analysis of factors related to lethality after treatment of perforated gastroduodenal ulcer. 1935-1985. *Ann Surg.* 1989; 209(4):418-23.
- [21]. Etonyeaku AC, Agbakwuru EA, Akinkuolie AA, Omotola CA, Talabi AO, Onyia CU et al. A review of the management of perforated duodenal ulcers at a tertiary hospital in south western Nigeria. *Afr Health Sci.*2013; 13(4):907-13. doi: 10.4314/ahs.v13i4.7
- [22]. Hamby LS, Zweng TN, Strodel WE. Perforated gastric and duodenal ulcer: an analysis of prognostic factors. *Am Surg.* 1993 May;59(5):319-23; discussion 323-4

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- [23]. Surapaneni S, S R, Reddy A VB. The Perforation-Operation time Interval: An Important Mortality Indicator in Peptic Ulcer Perforation. *J Clin Diagn Res.* 2013; 7(5):880-2. doi: 10.7860/JCDR/2013/4925.2965.Epub 2013 May 1.
- [24]. Jae-Myung K, Sang-Ho J, Young-Joon L, Soon-Tae P, Sang-Kyung Ci, Soon-Chan H et al. Analysis of Risk Factors for Postoperative Morbidity in Perforated Peptic Ulcer. *J Gastric Cancer.* 2012; 12(1):26-35. doi: 10.5230/jgc.2012.12.1.26.Epub 2012 Mar30.
- [25]. Oribabor FO, Adebayo BO, Aladesanmi T, Akinola DO. Perforated duodenal ulcer; management in a resource poor, semi-urban Nigerian hospital. *Niger J Surg.* 2013; 19(1):13-5
- [26]. Chaurasia B D. *Human Anatomy, sixth edition, volume II: CBS publisher & Distributor, p.250-253, 260-269.*
- [27]. Berne TV, Donovan A J. Non-operative treatment of perforated duodenal ulcer. *Arch surg.*1989; 124(7):830-2.
- [28]. Agarwal N , Saha S , Srivastava A , Chumber S , Dhar A , Garg S. Peritonitis: 10 years' experience in a single surgical unit. *Tropical Gastroenterology* 2007;28(3):117-20
- [29]. Bhogal RH, Athwal R, Durkin D, Deakin M, Cheruvu CN. Comparison between open and laparoscopic repair of perforated peptic ulcer disease. *World J Surg.* 2008; 32(11):2371-4. doi: 10.1007/s00268-008-9707-5
- [30]. Wadaani H Al. Emergent laparoscopy in treatment of perforated peptic ulcer: a local experience from a tertiary centre in Saudi Arabia. *World J Emerg Surg.* 2013; 8(1):10. doi: 10.1186/1749-7922-8-10
- [31]. Lunevicius R, Morkevicius M. Perforated duodenal ulcer: benefits and risks of laparoscopic repair. *Medicina (Kaunas).* 2004; 40(6):522-37
- [32]. Boey J, Choi SK, Poon A, Alagaratnam TT. Risk stratification in perforated duodenal ulcers. A prospective validation of predictive factors. *Ann Surg.*1987; 205(1): 22-6.
- [33]. Kumar K, Pai D, Srinivasan K, Jagdish S, Ananthakrishnan N. Factors contributing to re leak after surgical closure of perforated duodenal ulcer by Graham's Patch. *Trop Gastroenterol.* 2002;23(4):190-2
- [34]. Blomgren LG. Perforated peptic ulcer: long-term results after simple closure in the elderly. *World J Surg.* 1997; 21(4):412-4.
- [35]. Hermansson M, Staël von Holstein C, Zilling T. Surgical approach and prognostic factors after peptic ulcer perforation. *Eur J Surg.* 1999; 165:566-72. PubMed
- [36]. Arveen S, Jagdish S, Kadambari D. Perforated peptic ulcer in South India: an institutional perspective. *World J Surg.* 2009; 33(8):1600-4. doi: 10.1007/s00268-009-0056-9.

Tanushree Mandal "Surgical audit of peptic perforation among Scheduled Tribe patients attending Bankura Sammilani Medical College and Hospital, India." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 17, no. 6, 2018, pp 14-21