

A CLINICAL STUDY OF PATIENTS OF PEPTIC ULCER PERFORATION ADMITTED TO DEPARTMENT OF SURGERY AT DR. D.Y. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE

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ABSTRACT

Global health concerns include peptic ulcer disease (PUD). Recent findings indicate a global decline in peptic ulcer disease. Peptic ulcer perforation remains a severe health concern despite all of this. The pattern of perforated PUD varies by location due to sociodemographic and maybe environmental factors. Perforated PUD is seen in young males in poor nations like ours. In comparison, perforated PUD patients in industrialised nations are mostly older and have smaller gender inequalities. Due to the close association between drinking and smoking among young males, emerging nations have high rates. Despite the high number of cases in our area, perforated peptic ulcer disease is rare. We aim to provide our hospital's experience with perforated PUDs, including incidence, clinical presentations, treatment results, and morbidity and mortality.

Keywords: Peptic ulcer disease, Perforated Peptic ulcer, Gastric Ulcer, Duodenal Ulcer.

INTRODUCTION

A major global health issue is peptic ulcer disease (PUD). According to reports, the prevalence of peptic ulcer disease has decreased globally in recent years [1]. Additionally, there have been recent developments in the diagnosis and treatment of peptic ulcer disease, including enhanced endoscopic diagnostic and therapeutic capabilities, increasing utilization of proton pump inhibitors, and Helicobacter pylori eradication therapy.

One of a peptic ulcer's most serious consequences is perforation. It's still a life-threatening tragedy despite sophisticated management. The prevalence of peptic ulcer perforation hasn't altered despite all of this; thus, it still poses a serious health risk. Through a perforation, the abrupt evacuation of stomach or duodenal contents into the peritoneal cavity causes a catastrophic chain of events that, if not carefully controlled, can result in death. Any patient, whether they have a known chronic peptic ulcer or not, is susceptible to perforation, even those without any warning signs.

According to Lord Moynihan, "Perforation of duodenal or gastric ulcer is one of the most serious and most overwhelming catastrophes that can befall a human being".

According to several sociodemographic and maybe environmental reasons, the pattern of perforated PUD differs from one geographic location to another [2]. Young patients with a predominance of men present with perforated PUD in a developing nation like ours [3, 4]. This is in contrast to industrialised nations, where the elderly makes up the majority of the patient population with perforated PUD and

there are fewer obvious disparities in incidence rates between the sexes. The high frequency in developing nations is likely due to the extremely strong correlation between drinking and smoking among young males [4]. Undoubtedly, the high frequency in the West is brought on by older people ingesting ulcerogenic drugs [5]. Additionally, it has been shown that patients with perforated PUD arrive to centres for final therapy late in developing nations [6]. Many patients initially turned to traditional healers and unlicensed healthcare providers, which are common in poor nations [6].

In most cases, particularly with patients who have no prior PUD history, the diagnosis of perforated PUD may present a diagnostic challenge. However, the diagnosis of a perforation is not particularly difficult when the patient has a prior history of PUD and suddenly develops severe abdominal pain, vomiting, shock, and the classic signs of peritonitis. Other supporting evidence, such as sub diaphragmatic gas on a Chest x-ray PA view and findings on abdominal ultrasonography, can be helpful in some circumstances. Perforated PUD has historically been treated surgically in a variety of ways [7], but recently there has been a clear shift away from the traditional definitive peptic ulcer surgery toward the straightforward closure of the perforations with omental (Graham's) patch [8]. Following surgery, H. pylori eradication and the administration of proton pump inhibitor treatments are given. When patients appear late with gross and fulminating peritonitis and are consequently unsuitable for definitive peptic ulcer surgery, this strategy is even more relevant [12].

High morbidity and mortality following surgery for perforated peptic ulcer disease have been clearly linked to delayed identification and early initiation of surgical care of perforated PUD [9, 10]. It is obvious that early detection, quick diagnosis, rapid resuscitation, and early surgical intervention will help to keep morbidity and mortality low [11].

MATERIALS AND METHODS

Study Design: PROSPECTIVE STUDY.

Study area: Department of General Surgery, Dr. D Y Patil Medical College, Hospital & Research Center, Pimpri -18, Pune, Maharashtra.

Study Duration: September 2020 to April 2022 (18months)

Period required for data analysis and reporting: 6 months

Source of Data: In-patients admitted in DR.D.Y. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE from September 2020 to April 2022.

Sample Size: 50 Patients

INCLUSION CRITERIA

Patients of peptic ulcer perforation admitted in surgical wards during the study period.

EXCLUSION CRITERIA

1. Patients not willing to be a part of the study.
2. GI tract Perforation involving other than stomach and duodenum.
3. Traumatic/Iatrogenic perforation.
4. Immuno-compromised patients
5. Patients with known history of malignancy
6. Patients unfit for anaesthesia and managed conservatively

A written informed consent will be taken from all patients before their inclusion in the study.

Methodology

Approval from Ethical committee of the institute was taken, before the study began.

Patient presenting in the Casualty with suspected peptic ulcer perforation were screened and admitted solely based on their clinical history and physical examination, however in certain instances, Plain x-ray Erect Abdomen, Chest x-ray (PA view), and Ultrasound imaging of the abdomen and pelvis were

advised to confirm the clinical findings. CECT AP was used in certain cases to confirm the diagnosis. Other tests included Haematological indices, renal function test, serum electrolyte and urinalysis. Intravenous fluids, antibiotics (third generation cephalosporin with metronidazole), and nasogastric tube suction to decompress the stomach were used to successfully revive the patient. An appropriate level of hydration and resuscitation was indicated by a urinary output of >30 ml/h.

After primary resuscitation, patient was taken up for exploratory laparotomy using a midline incision. Exploration was done to determine the location of the perforation, as well as the size, volume, and type of the peritoneal exudate. With pedicled omentum as a cover, interrupted 2/0 Vicryl sutures were used to seal the duodenal perforation (Graham omentopexy). With generous amounts of warm normal saline peritoneal lavage done. A mass suture using No. 2 Nylon sutures was used to close the abdomen while leaving the intra-abdominal drain in place. All patients received intravenous fluids, and oral feeds were started after confirmation of bowel sounds. Additionally, for a period of four to six days following surgery, all patients received intravenous antibiotics using third generation cephalosporin and metronidazole infusion. The patients were discharged after full recovery.

No external or internal funding sources will be used for the conduct of this study.

OBSERVATIONS AND RESULTS

Fig. 1: Bar diagram showing age wise distribution of study subjects

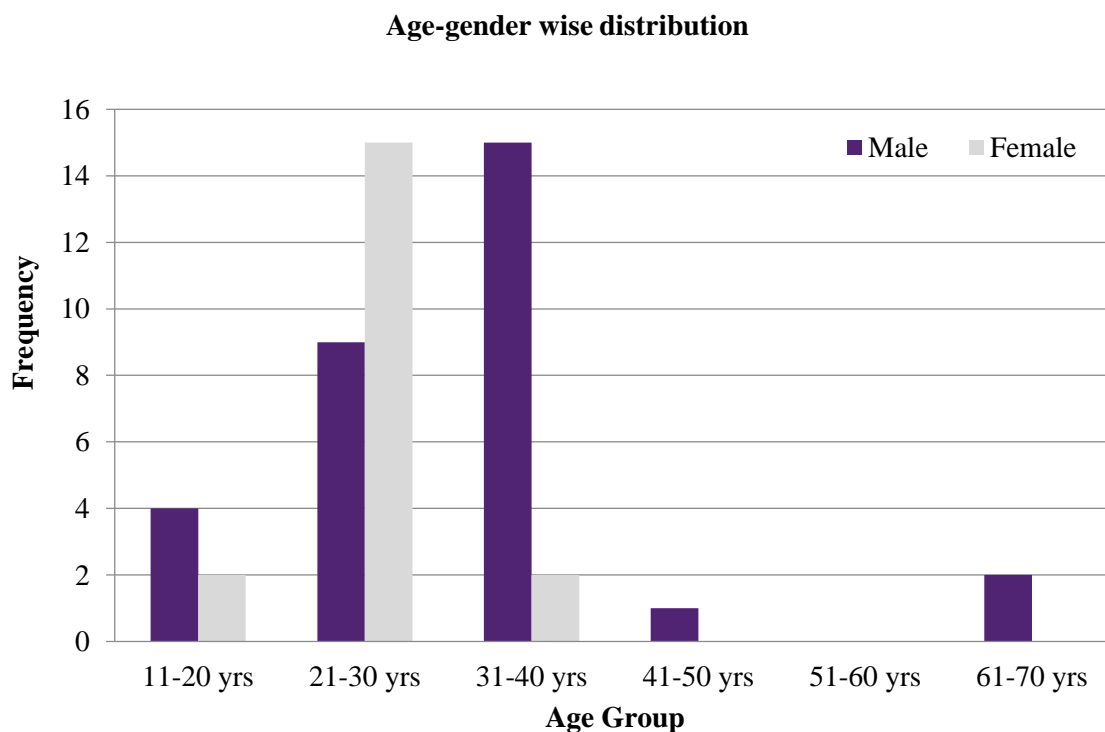
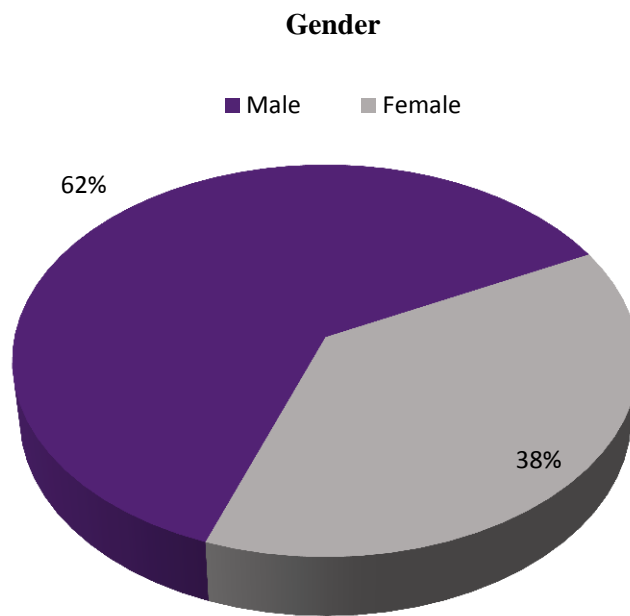
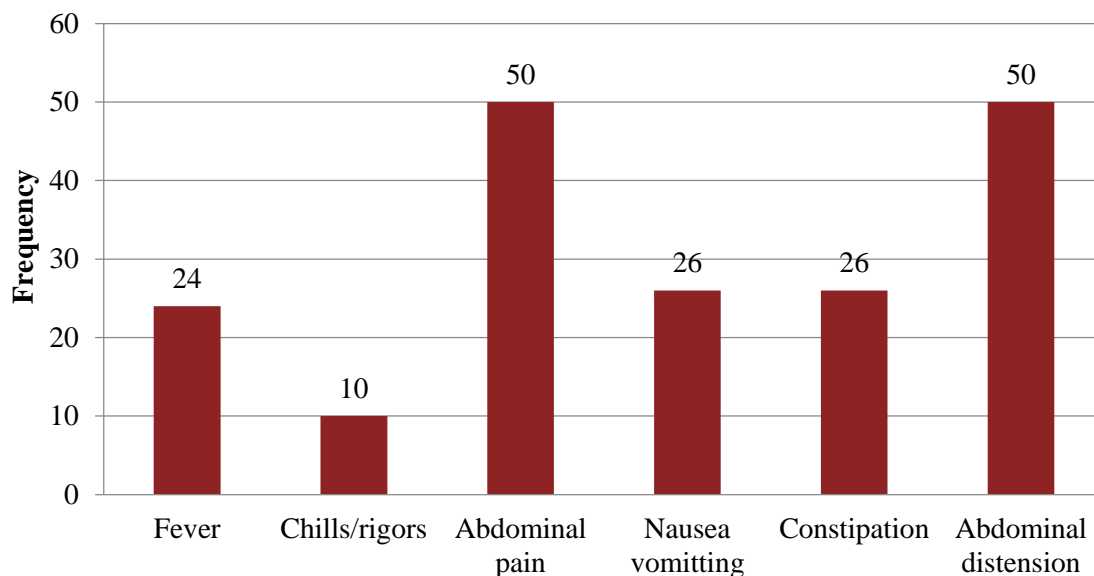


Fig. 2: Gender wise distribution of study subjects



Mean age of 50 study sample was 30.24 years (standard deviation – 9.697 years), with the highest 65 years and lowest 17 years. There was 31 (62%) males and 19 (38%) female in the study while 24 (48%) samples were from 21-30 years age group followed by 17 (34%) subjects in 31-40 years age group.

Fig. 3: Bar diagram showing chief complaint among study subjects



Chief complaint among study subjects

Above bar diagram shows that, abdominal pain & distension (100% each) was most common complaint among peptic ulcer perforation subjects followed by nausea vomiting & constipation (52%) while fever (48%), with chills or rigors was present in (20%) subjects. Some subjects were having more than one complaint.

Table 1: Past & personal history among subject having perforated peptic ulcer

Past & personal history		Frequency	Percent
Diet	Vegetarian	10	20
	Mixed (spicy)	40	80
Addiction	Smoking	16	32
	Alcohol	8	16
Previous History	Previously diagnosed with PUD	24	48
	Previously On Treatment for Peptic ulcer	16	32
	Ingestion of NSAIDS	25	50
Comorbid condition	Diabetes mellitus	12	24
	HTN	6	12

Above table shows that, 48% subjects were previously diagnosed with PUD in the past for which 32% have taken treatment. Majority of patient (80%) were having mixed diet, Smoking and alcohol addiction was present in 32% and 16% of subjects respectively. Details of past and personal history as per above table.

Table 2: General examination findings among subject having perforated peptic ulcer Statistics

Statistics	Pulse (rate/min)	Systolic BP (mmHg)	Diastolic BP (mmHg)	RR (rate/min)
Mean	105.76	116.80	76.88	16.00
Std. Error of Mean	1.299	1.164	.953	.249
Std. Deviation	9.184	8.231	6.739	1.687
Range	34	30	28	6
Minimum	90	100	60	14
Maximum	124	130	88	20

On general examination 9 (18%) subjects with perforated peptic ulcer were having fever, no subjects were having pallor, icterus, cyanosis, lymphadenopathy and oedema. Mean pulse among study subjects was 105.76 + 9.18 beats/min suggestive of mainly tachycardia while mean systolic blood pressure was 116.8 + 8.23 mmHg. Details of diastolic blood pressure and respiratory rate as per above table.

Table 3: Positive systemic examination findings among subject having perforated peptic ulcer

Systemic examination		Frequency	Percent
Abdomen	Distended	32	64
	Flat	18	36
Local rise of temperature	Present	50	100
Tenderness	Diffuse	33	66
	Epigastrium	17	34
Guarding, rigidity	Present	36	72
Bowel sound	Sluggish	39	78
	Absent	11	22

Above table shows that, 32 (64%) cases with perforated peptic ulcer were having distended abdomen followed by 18 (36%) with flat abdomen. Diffuse tenderness on palpation was noted in 33 (66%)

subjects, with sluggish abdominal sound on auscultation was observed in 39 (78%) subjects. Details of abdominal system examination as per above table. Respiratory, renal, CVS and CNS not having significant abnormality.

Table 4: Imaging findings among subject having perforated peptic ulcer

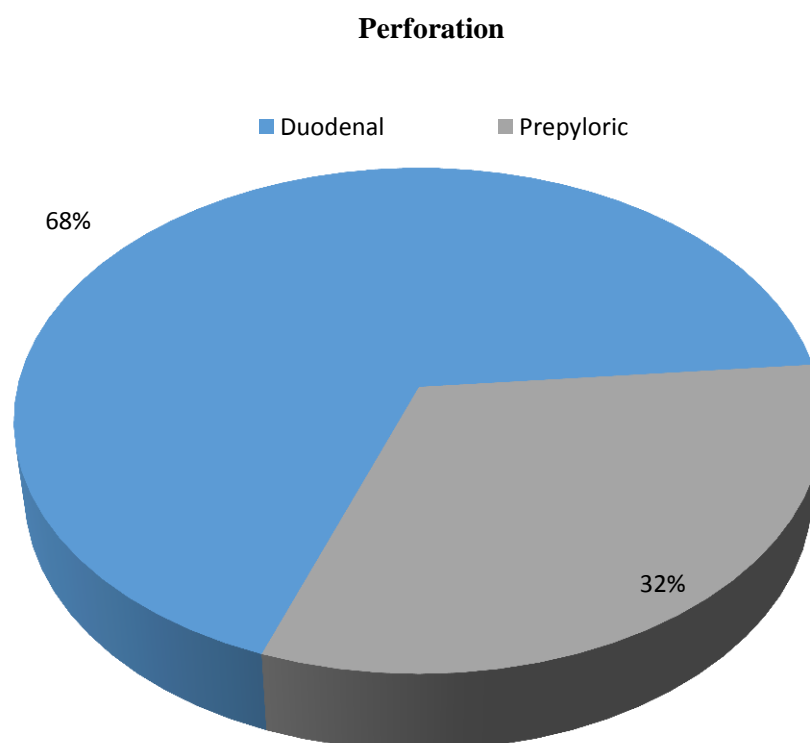
Investigations findings		Frequency	Percent
X ray erect abdomen	Gas under diaphragm	41	82
	No pneumoperitoneum	9	18
Chest X ray (PA view)	Gas under the diaphragm with Normal lung parenchyma	41	82
	No Gas under the diaphragm with Normal lung parenchyma	9	18
USG abdomen	Suggestive of sluggish peristalsis with free fluid	40	80
	Minimal free fluid seen	10	20
CECT AP	Pneumoperitoneum with free fluid	9	18

Above table shows that, in 41 (82%) subjects having perforated peptic ulcer gas under diaphragm detected on erect x- ray abdomen AP view and C-xray (PA view), following which 9 patients were subjected to CECT AP that showed Pneumoperitoneum. While in 40 (80%) ultrasonography suggestive of sluggish persistalsis with free fluid. ECG were normal in all subjects.

Table 5: Intra-Operative findings

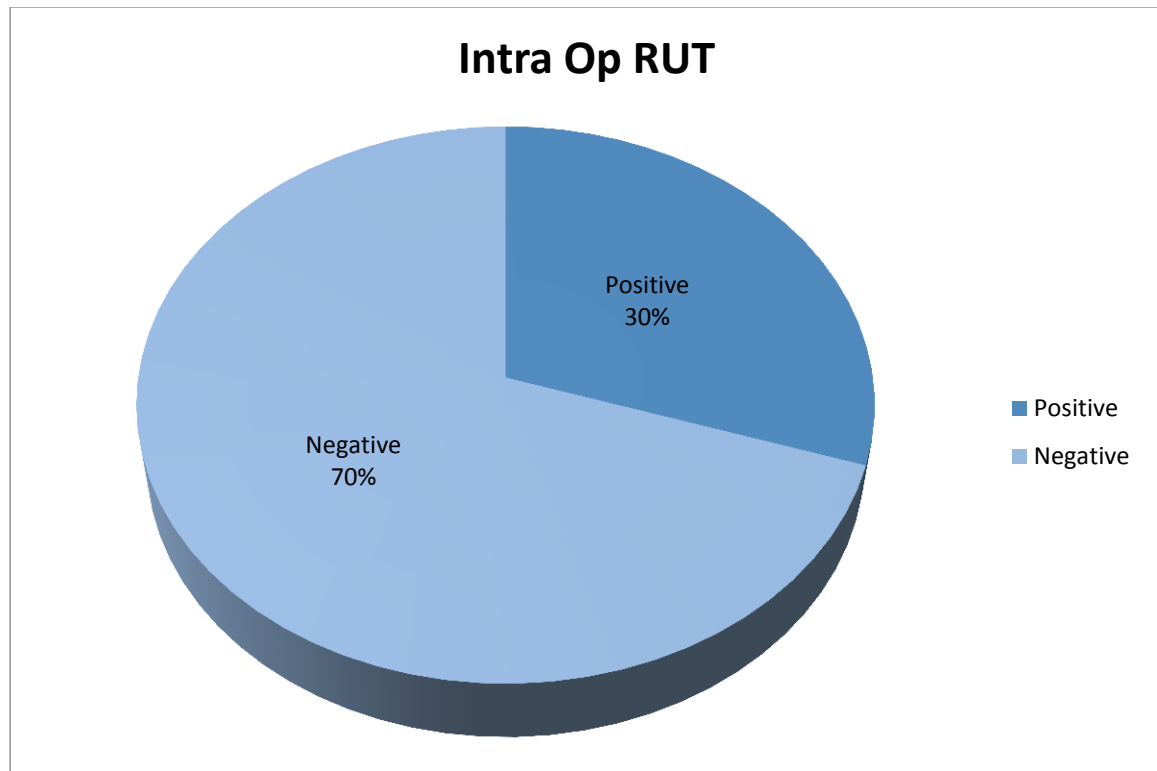
Intra-Operative findings	Frequency	Percent
Duodenal perforation	34	68
Pre pyloric perforation	16	32
Positive rapid urease test	15	30

Fig. 4: Distribution according site of perforation



All 50 subjects were treated under general anaesthesia with upper midline incision for exploratory laparotomy with omental patch repair. 68% subjects were having duodenal perforation while 32% remaining with pre-pyloric perforation.

Fig. 5: Intra Operative RUT

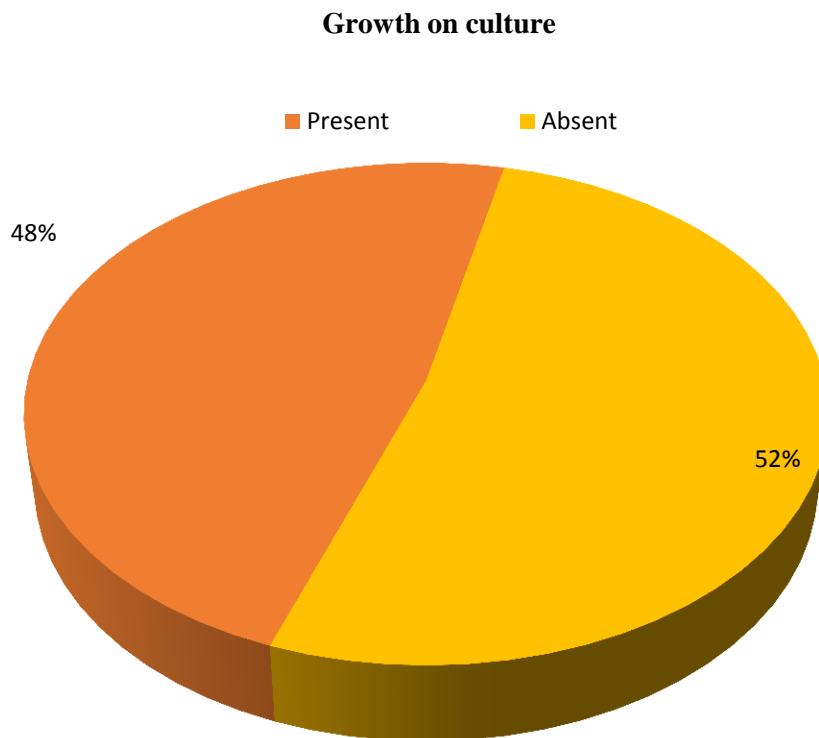


Intra Operatively, samples were taken from the peri ulcer margin and tested for rapid urease test out of which 15 samples (30%) turned positive.

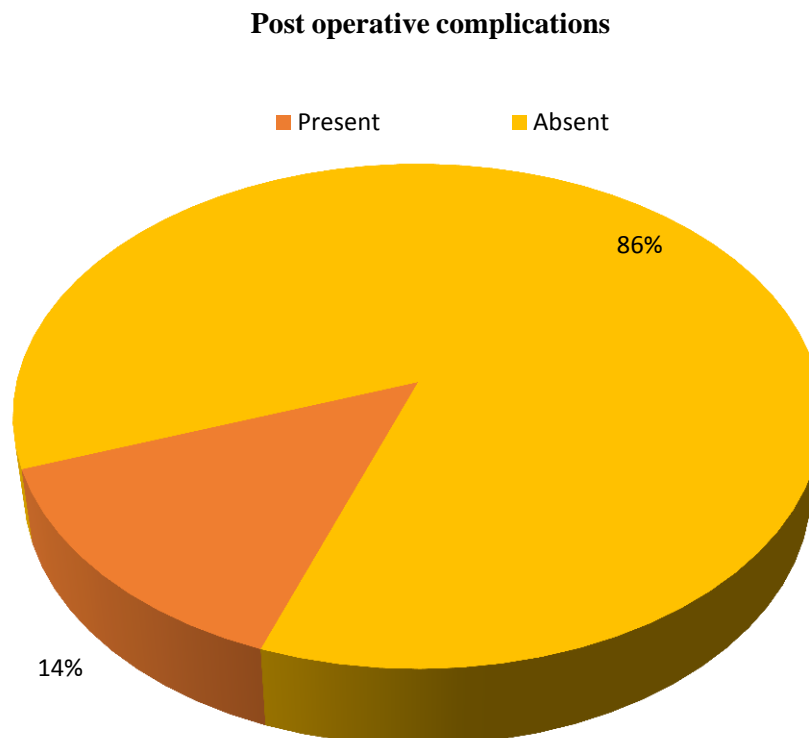
Table 6: Intra-operative Culture Sensitivity Of Peritoneal Fluid

Peritoneal culture growth	Frequency	Percent
E coli	13	26
Klebsiella	8	16
Proteus	3	6
No growth	26	52

E coli (26%) was most common organism found in aspirated peritoneal fluid on culture followed by Klebsiella (16%) and Proteus (6%), there was no growth from 26 (52%) samples.

Fig. 6: Aspirated peritoneal fluid on culture**Post-operative Complications:**

All 50 subjects with peptic ulcer perforation operated with exploratory laparotomy with omental patch repair were medicated with analgesic, antibiotics, antiemetics & IV fluids.

Fig. 7: Post-operative Complications

Post-operative complications were present reported in 7 (14%) subjects such as wound infection, while remaining 43 (86%) without any complications. No mortality was observed among study subjects.

DISCUSSION

Patients with perforated peptic ulcers usually present with features of perforative peritonitis with sepsis, which is a major cause of mortality in this population (PPU). As a result, research and actions designed to prevent, identify, and treat sepsis in PPU patients may lower mortality and morbidity. This can be achieved by methodically looking for symptoms of septicaemia and administering care, which include fluid resuscitation, culture sensitivity, empirical broad-spectrum antibiotics, and source management [72]. A non-randomized clinical trial for PPU investigated a multidisciplinary perioperative strategy based on such concepts, and the results showed a statistically significant decrease in mortality.

There is no single indicator that can reliably identify individuals at high risk and poor prognosis, however older age, comorbidity, and postponement of surgery have all been linked to a greater risk of mortality. Clearly, identification of modifiable risk factors with the potential to improve outcome is of great interest.

Patients in this research range from 11 to 70, with the oldest patient being 65 and the youngest being 17. Age is not a factor in perforation, yet the peak age incidence ranged from the second to the fourth decade. The demographic profile of industrialised nations, where the majority of patients are over 60, and where the incidence of perforated PUD was shown to be greater in females using ulcerogenic medicines, contrasts from that of our study, which is similar to previous studies in poor countries [73-76]

Only 19 cases of females with perforated peptic ulcers were seen in the present study's 50 cases; the other 31 cases were all male. According to the published finding, our study indicated that men are more likely than women to have perforated peptic ulcers.

In this study, 40% of the patients had a history of NSAID use, which increases the risk of peptic ulcer perforation in the majority of patients over the age of 50 who have taken NSAIDs in the past. Injuries to the gastrointestinal mucosa are linked to long-term use of NSAIDs, particularly low-dose aspirin. The risk of serious gastrointestinal toxicity is highest in patients with several risk factors, such as a history of peptic ulcer disease, advancing age, co-prescribing corticosteroids and anticoagulants, and high-dose and prolonged NSAID usage. Before giving NSAIDs to patients who have several risk factors, doctors must evaluate these risks and take risk-reduction measures. [80]

Only 40% of the patients in our series had ever consumed NSAIDS. Millennials are more likely to smoke tobacco related products and consume alcohol excessively than the general population, which may contribute to the high frequency of perforated PUD. The majority of patients who smoked tobacco also often consumed alcohol. As a result of smoking's inhibition of pancreatic bicarbonate secretions, which tend to balance acid secretion, the duodenal pH is predisposed to being more acidic. Additionally, it delays the healing of duodenal ulcers [77]. On the other side, alcohol increases gastrin release, accelerates stomach acid output, and predisposes to gastric ulcers. [78] It has been demonstrated that *H. pylori* infection is a substantial risk factor for perforated PUD, particularly in young patients, who make up the bulk of our patients, with a mean prevalence of 65 to 70%. [79] In our study, samples were obtained intraoperatively from the peri ulcer border and were evaluated for rapid urease, of which 15 samples (i.e-30%) were positive. Our results are consistent with earlier research done in the underdeveloped nations [77, 81–83].

In the current study, the majority of our patients arrived to the casualty with symptoms post 24 hours. The reason for the late presentation in our series may be because the majority of patients initially sought treatment from General medical professionals and/or traditional healers. This behaviour is widespread in our society, and it is blamed on ignorance, religious convictions, lack of simple access

to medical facilities, and the hefty price tag associated with hospital care. Only when pain becomes intolerable and the patient's health is worsening, hospital treatment is sought for. Studies have demonstrated that reduced fatality rates were related with shorter mean times between perforation and surgical intervention. [84] The median time in our dataset between the start of symptoms and effective therapy was 41 hours. Perforated PUD is often diagnosed by a clinical process [80, 85].

During laparotomy, operative findings of 16 patients were gastric perforations, whereas 34 patients had anterior duodenal perforations. In Sudan, a country in North Africa, a high duodenal to stomach ulcer ratio of 25:1 was discovered. [86] These ratios stand in stark contrast to the low ratios of 3.1 to 4.1 found in the Western world for duodenal to stomach ulcers. [87] No patient had a vagotomy and drainage as a final antiulcer procedure. The majority of patients had moderate to severe peritoneal soilage, which limits any kind of effective antiulcer surgery. This was one of the main causes. [87] Second, simple closure of perforated gastric or duodenal ulcers has been demonstrated to be rapid and easy to perform, safe with tolerable morbidity and mortality [88]. It is now universally acknowledged as a regular technique. All patients had mass closure of the laparotomy incision and extensive peritoneal lavage with warm normal saline after the perforation was simply closed. An intra-abdominal drain was maintained in place. All of our patients received proton pump inhibitors and a six-week course of Helico Pylori eradication medication after surgery.

Our series, the total complication rate was 14%, which was lesser than those from other sources. [88] The significant complication rates of 32%, were documented in several other studies. In our research, surgical site infection was the most frequent complication, which is consistent with other studies. [89] Due to the acute bacterial peritonitis, the incision was heavily contaminated, which contributed to the high incidence of surgical site infections. Pulmonary infections, ongoing peritonitis, ongoing septic shock, prolonged paralytic ileus, and wound dehiscence were among the other problems seen in similar studies. These complications had several causes such as delay between initiation of symptoms and presentation of patient with symptoms to the hospital. Few critically sick patients required prolonged resuscitation upon presentation due to septicemic shock, and significant peritoneal soiling as a result of delayed presentation, in turn lead to further delay in surgical intervention.

Fortunately, there were no recorded postoperative fatalities in our case series.

CONCLUSION

Our research indicates that peptic ulcer perforation occurs most frequently in second & fourth decades of life. The majority of the patients were men, and other risk factors included smoking, drinking alcohol, using NSAIDs, and having a history of peptic ulcer disease. The most frequent complication seen throughout the trial was surgical site infection. Older individuals who seemed to have comorbid conditions and, more notably, delayed presentation to the hospital with symptoms have much higher mortality and morbidity rates.

Peptic Ulcer Disease may now be managed with medicines if diagnosed in time. If not treated properly can lead to complications. The second most frequent complication after bleeding is perforation. PPU carries a high mortality risk. PPU is characterised by the triad of tachycardia, abdominal guarding & rapid onset of abdominal pain. Any patient who exhibits PUD symptoms should be advised to undergo upper GI-Endoscopy and a rapid urease test, and after being identified as PUD, they should receive the appropriate treatment.

Exploratory laparotomy and omental patch repair remain the gold standard for surgical repair in PPU patients, however innovative approaches may be further studied to identify alternatives.

In order to lower morbidity and mortality, additional focus is urgently needed, as this is one of the commonest health problem. To enhance results, early diagnosis, immediate resuscitation, and urgent

surgical intervention are necessary. The gold standard for surgical repair in cases of PPU is still exploratory laparotomy & repair of perforation however novel procedures may be further researched to find alternatives. Further research should be done to identify prognostic markers and treatment approaches that might improve recovery, lower morbidity, and perhaps even lower death. In a similar way, some individuals with minor symptoms could gain from less intrusive therapy techniques. To determine the most secure and effective management techniques as well as the proper selection criteria, groups should be examined in prospective protocols and trials. There is a need for lengthy follow-up studies that assess quality of life.

REFERENCES

1. Makela JT, Klvinemi H, Ohtonen P, Laitinen SO. Factors that predict morbidity and mortality in patients with perforated peptic ulcers. *Eur J Surg* 2002;168: 446e51.
2. Kudva MV, Thein-Htut T. Profile of peptic ulcer disease in Malaysia. *Sing Med J* 1988;29:544e7.
3. Hill AG. The management of perforated peptic ulcer in a resource poor environment. *East Afr Med J* 2001;78(8):346e8.
4. Ersumo TW, Mesksi Y, Kotisso B. Perforated peptic ulcer in Tikur Abessa hospital: a review of 74 cases. *Ethiop Med J* 2005;43:9e13.
5. Windsor JA, Hill AG. The management of perforated peptic ulcer. *N Z Med J* 1995:47e8.
6. Ajao OG. Perforated duodenal ulcer in a tropical African population. *Natl Med Assoc* 1979;71:272e5.
7. Gurleyik E. Changing trend in emergency surgery for perforated duodenal ulcer. *J Coll Physicians Surg Pak* 2003;13:708e10.
8. Ng EK, Lam YH, Sung JJ, Yung MY, To KF, Chan AC, et al. Eradication of *Helicobacter pylori* prevents recurrence of ulcer after simple closure of duodenal ulcer perforation: randomized controlled trial. *Ann Surg* 2000;231:153e8.
9. Bas G, Erylimaz R, Okan I, Sahin M. Risk factors of morbidity and mortality in patients with perforated peptic ulcer. *Acta Chir Belg* 2008;108:424e7.
10. Boey J, Choi KY, Alagaretnam TT, Poon A. Risk stratification in perforated duodenal ulcers. A prospective validation of predictive factors. *Ann Surg* 1986;205:22e6.
11. Hermansson M, Von Holsetein CS, Zilling T. Surgical approach and prognostic factors after peptic ulcer perforation. *Eur J Surg* 1999;165:566e72.
12. Nuhu A, Madziga AG, Gail BM. Acute perforated duodenal ulcer in Maiduguri. *Internet J Surg* 2009;21:1.
13. Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, Opal SM, et al. Surviving sepsis campaign: International guidelines for management of severe sepsis and septic shock: 2012. *Crit Care Med* 2013;41:580-637.
14. Chaiya LP, Mabula JB, Koy M, Mchembe MD, Jaka HM, Kabangila R, et al. Clinical profile and outcome of surgical treatment of perforated peptic ulcers in Northwestern Tanzania: a tertiary hospital experience. *World J Surg* 2011;6:31.
15. Ohene-yeboah M, Togbe B. Perforated gastric and duodenal ulcers in an urban African population. *West Afr J Med* 2006;25:205e11.
16. Kang JY, Elders A, Majeed A. Recent trend in hospital admission and mortality rate for peptic ulcer in Scotland 1982e2002. *Aliment Pharmacol Ther* 2006;24(1):65e9.
17. Walt R, kastchinski B, Logan R, Ashley J. Rising frequency of ulcer perforation in elderly people in the United Kingdom. *Lancet* 1986;3:489.

18. Stabile BE, Passaro EP. Duodenal ulcer: a disease in evolution. *Curr Probl Surg* 1984;21:1e79.
19. Tukdogan MK, Hekim H, Tuncer I, Aksoy H. The epidemiological and endoscopic aspects of peptic ulcer disease in Van region. *East J Med* 1999;4(1):6e9.
20. Gisbert JP, Legido J, Garcia-Sanz I, Parares JM. Helicobacter pylori and perforated ulcer prevalence of infection and role of non-steroidal anti-inflammatory drugs. *Dis Liver Dis* 2004;36(2):116e20.
21. Drini M. Peptic ulcer disease and non-steroidal anti-inflammatory drugs. *Aust Prescr* 2017;40:91-3.
22. Lawal OO, Fadiran OA, Oluwale SF, Campbell B. Clinical pattern of perforated prepyloric and duodenal ulcer at Ile-Ife, Nigeria. *Trop Doct* 1998;28: 152e5.
23. Subedi SK, Afaq A, Adhikary S, Niraula SR, Agrawal CS. Factors influencing mortality in perforated duodenal ulcer following emergency surgical repair. *J Nepal M Assoc* 2007;46:31e5.
24. Tessema E, Meskel Y, Kotiss B. Perforated peptic ulcer in Tikur Anbessa hospital. *Ethiop Med J* 2005;43(1):9e13.
25. Bin-Taleb AK, Razzaq RA, Al-Kathiri ZO. Management of perforated peptic ulcer in patients at a teaching hospital. *Saudi Med J* 2008;29:245e50.
26. Kuremu RT. Surgical management of peptic ulcer disease. *East Afr Med J* 2002;76(9):454e6.
27. Fedail S, Araba BMO, Homeda MM, Ghandour ZM. Upper gastrointestinal endoscopy in Sudan: Analysis of 2500 endoscopies 1983;2. 897e9.
28. Hennessy E. Perforated peptic ulcer: mortality and morbidity in 603 cases. *ANZ J Surg* 1972;41(3):243e52.
29. Khalil AR, Yunas M, Qutbe AJ, Nisar W, Imran M. Graham's omentopexy in closure of perforated duodenal ulcer. *J Med Sci* 2010;18(2):87e90.
30. Sharma SS, Manju PM, Sharma SM, Kulkarni H. A prospective cohort study of postoperative complications in the management of perforated peptic ulcer.