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Original Research Article

A Prospective Clinical Study on Prognostic Factors in Perforative Peritonitis in a Tertiary Care Hospital

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Abstract:

Background: Peritonitis resulting from gastrointestinal tract perforations, which are frequent in this nation, necessitates immediate surgical surgery and has high rates of morbidity and death. The most serious consequence, a perforated duodenal ulcer, is thought to have a high death rate. In the past, this risk was attributed to factors such as delayed patient presentation, surgical postponement, and inadequate use of antibiotics.

Methods: All patients of duodenal ulcer perforation who were admitted and treated in ACSR Medical College, Nellore between the period of August 2021 to November 2022 were studied after obtaining written informed consent. Approval of institutional ethical committee was obtained before the start of the study.

Results: 110 patients of duodenal ulcer perforation who underwent surgery were studied. 32 (29.09%) patients belonged to above 60 years age group. The male: female ratio was 6.85:1. Among the sociodemographic factors, increasing age (>60 years), was found to be having a significant relationship with mortality following surgery. 37.27% of the study population had IHD, 40.90% used NSAIDs, 10.90% presented with shock and 50% presented to the health facility later than 24 hours. Ischaemic heart disease, use of NSAIDs, presence of shock during admission and late presentation were all associated with mortality.

Conclusions: Increasing age, presence of IHD, use of NSAIDs, patients presenting in shock and those who presented late to the health facility, all had a poor prognosis.

Keywords: Peritonitis, Duodenal Ulcer, Ischaemic Heart Disease, NSAIDs

Background

Inflammation of the serosal membrane lining the abdominal cavity and its organs is known as peritonitis. Bowel perforations are a common way for an infection to enter the usually sterile peritoneal environment and cause peritonitis. The introduction of a chemically irritating substance, such as stomach acid from a ruptured ulcer, may also be the cause of the illness. This nation has many cases of peritonitis owing to gastric perforations, which need immediate surgical intervention and has high rates of morbidity and death.

In 1843, Crisp published the first clinical report of a perforated peptic ulcer. Two major risk factors for perforation are non-steroidal anti-inflammatory medication usage and smoking. The clinical diagnosis is established, and radiographs showing pneumoperitoneum corroborate the diagnosis.

The most serious consequence, a perforated duodenal ulcer, used to have a high death rate because of the patient's delayed presentation, the surgical site's delay, and the absence of the right antibiotics. [1]

According to some writers, throughout the previous three decades, there has been a decrease in the incidence of peptic ulcer illness and perforation. The management of peptic ulcer disease has changed as a result of advancements in the use of a wide variety of medications in medical therapy, and surgery has become less common in the elective context.

Males are more likely to get perforation in middle and old age, and the epidemiological trend varies globally. In western nations, incidence is somewhat

on the decline. [2] It has been suggested that stress and strain may be the reason for the rise in occurrence.

Operative treatment includes the age-old procedure of closing the oral patch, which can be completed laparoscopically. Currently used extensively, laparoscopic techniques for closing duodenal holes have the potential to become the gold standard in the future, particularly for patients whose perforations are less than 10 mm and who appear within the first 24 hours of experiencing discomfort.

The current study's objective is to examine the likely causes of duodenal ulcer perforation as well as the poor prognostic variables that affect the ulcer's mortality and morbidity.

Early hospital admission, early diagnosis, timely surgical treatment, and the use of suitable and sufficient antibiotics can all help lower the death rate in cases of perforated peptic ulcers. The prognosis for duodenal ulcer perforation has improved due to a number of variables, including enhanced critical care and ICCU facilities, appropriate fluid and electrolyte replenishment, and thorough peritoneal toilet. [3]

Relevant literature about peptic ulcer disease and advances in medical therapy, about peptic ulcer perforation and recent trends in the management of perforation has been reviewed and presented in this study. [4]

Aims and Objectives

1. To investigate clinical risk factors for duodenal ulcer perforation and their relationship to surgical outcome.
2. Researching sociodemographic characteristics in connection to the result of duodenal ulcer perforation surgery.
3. To examine the mortality and morbidity rates among individuals who have peritonitis as a result of a perforated duodenal ulcer.

Methods

This prospective study included all patients of duodenal ulcer perforation who were admitted and treated in ACSR Medical College, Nellore between the period of August 2021 to November 2022. A performa was used to collect history, examination findings, investigation findings, sociodemographic details of the patient and associated comorbid conditions. The patients underwent simple omental patch closure and were regularly followed up up to a period of two months. These patients were assessed for any complications during the study period and they were recorded in a performa. Outcome of the patients was recorded in terms of death or alive after two months follow up period. Prior approval from institutional ethical committee was obtained before the start of the study.

Inclusion Criteria

1. All patients above age 18 years presenting with duodenal perforation.
2. Patient giving written informed consent.

Exclusion Criteria

1. Perforation other than duodenal ulcer perforation.
2. Perforation secondary to blunt trauma or penetrating trauma.

Statistical Software Methods

The data was entered in Microsoft Office Excel 2007 and IBM SPSS version 11.0 and Systat 8.00 was used for the analysis of the data. The data was depicted as frequencies and percentages. Chi square test was used to find the statistical significance between categorical variables and a p value <0.05 was considered to be statistically significant.

Results

Table 1: Relationship between Sociodemographic Factors and Mortality in the Study Population

Sl. No.	Sociodemographic Factors	Dead Patients	Survived Patients	Total Patients	Chisquare Value	P Value
	Age Group					
1	18 – 39 Years	1 (2.77%)	35 (97.22%)	36 (100%)	13.840	0.0009*
2	40 – 59 Years	2 (4.76%)	40 (95.23%)	42 (100%)		
3	≥ 60 Years	9 (28.12%)	23 (71.87%)	32 (100%)		
	Gender					
1	Male	9 (9.37%)	87 (90.62%)	96 (100%)	1.8265	0.1765
2	Female	3 (21.42%)	11 (78.57%)	14 (100%)		
	Residence					
1	Rural	7 (16.27%)	36 (83.72%)	43 (100%)	2.0946	0.1478
2	Urban	5 (7.46%)	62 (92.53%)	67 (100%)		

From Table 1 it can be seen that the frequency and proportion of mortality increased among the study population at higher ages. This was also found to be statistically significant. There was no relationship between gender or place of residence with mortality.

Table 2: Relationship Between Selected Risk Factors and Mortality in Patients who Underwent Surgery for Duodenal Ulcer Perforation

Sl. No.	Risk Factors	Dead Patients	Survived Patients	Total Patients	Chisquare Value	P Value
	Diabetes Mellitus					
1	Present	3 (25%)	9 (75%)	12 (100%)	2.7517	0.0971
2	Absent	9 (9.18%)	89 (90.81%)	98 (100%)		
	Hypertension					
1	Present	6 (13.04%)	40 (86.95%)	46 (100%)	0.3706	0.5426
2	Absent	6 (9.37%)	58 (90.62%)	64 (100%)		
	Ischaemic Heart Disease					
1	Present	8 (19.51%)	33 (80.48%)	41 (100%)	4.9776	0.0256*
2	Absent	4 (5.79%)	65 (94.20%)	69 (100%)		
	Copd					
1	Present	3 (15.78%)	16 (84.21%)	19 (100%)	0.5628	0.4531
2	Absent	9 (9.89%)	82(90.10%)	91 (100%)		
	Smoking					
1	Present	5 (7.14%)	65 (92.85%)	70 (100%)	2.8095	0.0937
2	Absent	7 (17.5%)	33 (82.5%)	40 (100%)		
	Alcohol					
1	Present	7 (18.91%)	30 (81.08%)	37 (100%)	3.6804	0.0550
2	Absent	5 (6.84%)	68 (93.15%)	73 (100%)		
	NSAIDS					
1	On NSAIDs	9 (20%)	36 (80%)	45 (100%)	6.4757	0.0109*
2	Not on NSAIDs	3 (4.61%)	62 (95.38%)	65 (100%)		
	Presence of Shock					
1	Present	8 (66.66%)	4 (33.433%)	12 (100%)	43.085	<0.00001*
2	Absent	4 (4.08%)	94 (95.91%)	98 (100%)		
	Time of Presentation					
1	< 24 Hours	2 (3.63%)	53 (96.36%)	55 (100%)	5.9864	0.0144*
2	> 24 Hours	10 (18.18%)	45 (81.81%)	55 (100%)		

From Table 2 , it is evident that presence of Ischaemic Heart disease (IHD), consumption of NSAIDs, presence of shock and late presentation of the patient had a statistically significant relationship with mortality.

The most common post operative complication among the study population was wound infection (47%) followed by chest infections (27%). Least common complications were bile leak (2%) and deep vein thrombosis (2%).

Discussion

In the last few years, since the introduction of H2 blockers, proton pump inhibitors and treatment to eradicate H.pylori, the number of cases presenting with uncomplicated peptic ulcer has decreased thereby decreasing the elective surgery done for uncomplicated peptic ulcer. The number of patients hospitalised with peptic ulcer perforation has not reduced, despite a drop in the number of simple peptic ulcer cases. Despite advancements in perioperative monitoring and treatment, the incidence of emergency surgery for perforated peptic ulcers, a consequence of peptic ulcer disease, has somewhat increased, as has the death rate of patients undergoing surgery for perforated peptic ulcers.[4]

In this study in our institution in department of general surgery 110 patients presenting with perforated duodenal ulcer were considered. The purpose of this study is to identify the factors influencing the postoperative complications and mortality. We found that factors like age, sex, smoking, alcohol, duration of perforation and peritoneal contamination as prognostic factors in the outcome of these patients.

In this study incidence of perforated duodenal ulcer was high in older age and incidence increasing with increase in age.

This increased incidence in older age may be due to decreased levels of prostaglandins in the gastrointestinal mucosa thus exposing to increased risk of ulcerogenic damage.

Age Incidence

In present study highest incidence of perforation was in the age group of 60-70 years (26%) followed equal incidence observed in age groups of 50- 60 years (21%) and 40-50 years (21%). Similar

incidence was observed in other studies.

In this study incidence of perforated duodenal ulcer was high in older age and incidence increasing with increase in age.

This increased incidence in older age may be due to decreased levels of prostaglandins in the gastrointestinal mucosa thus exposing to increased risk of ulcerogenic damage.

Another possible contributing factor is the increased use of non- steroidal anti-inflammatory drugs in the elderly and other concomitant diseases. [5]

Sex Incidence

Perforated duodenal ulcer is more common in men than women during this century. In this present study out of 110 patients 96 were males and 14 were females giving a sex incidence of male to female as 7:1.

The difference in incidence of perforated peptic ulcer among male and female may be due to increased smoking and alcohol intake among men compared to women, which are risk factors for the perforated duodenal ulcer.

Differences in sex incidence in various studies may be due to differences food habits, alcohol and smoking in different parts of the world among males and females.

Smoking

Smoking is one of the commonest risk factors noted in this study. Cigarette smoking can reverse the effect of H2 receptor antagonists on gastric acid secretion in patients with duodenal ulcer. Smoking inhibits the pancreatic secretion of bicarbonate. Nicotine has been shown to stimulate basal acid secretion. Smoking is reported to cause fall in duodenal pH.

The association between ulcer perforation and smoking seems biologically plausible. Smoking causes immediate vasoconstriction in the mucosa of upper gastrointestinal tract. Ischemia reduces mucosal resistance against the action of acid and may thus contribute to ulcer perforation. This mechanism could explain why we observe an increased risk in smokers. [6]

In this study smoking was present in 63% of the patients. Smoking is noted as an important risk factor in other studies also.

Alcohol

Alcohol consumption and cigarette smoking are two etiological factors that have a close relationship with peptic ulcer diseases. Chronic active gastritis is reportedly associated with chronic alcohol ingestion.

Alcohol has been shown to affect the mucosal barrier and histology. The risk of ulcers is increased when alcohol and cigarettes are consumed simultaneously. [7]

NSAIDS

NSAIDS cause prostaglandin deficiency which causes microvascular disturbances in the upper gastrointestinal mucosa leading to decreased mucosal blood flow leading to mucosal damage. Asprin and other drugs with a direct irritative action harm the upper gastrointestinal system. [8]

According to Thorsen et al.'s research, 53% of patients who present with a perforated duodenal ulcer use NSAIDS. [9] Seth et al in their study on 49 patients with duodenal ulcer perforation NSAIDS intake is seen in 24 patients (47%).

Some studies have shown that the overall risk of adverse gastrointestinal events is more by three times in patients taking NSAIDS. For people older than 60, this risk doubles five times. [10]

In this present study of patients presenting with perforated duodenal ulcer NSAIDS usage is seen in 12% of the patients.

Post-Operative Complications

A number of variables affect the mortality and post-operative morbidity in patients with perforated duodenal ulcers. Some risk factors influencing the outcome are age over 60, treatment delay or lengthening the time between symptom onset and hospital presentation, shock at presentation, coexisting diseases, elevated renal parameters upon hospital presentation, and hypoalbuminemia. [11,12]

Post-operative mortality increases in elderly by 3 to 5 times higher. This may be due to presence of medical comorbidities, delayed presentation, atypical presentation or delay of >24 hours in diagnosis.[13] Kumar et al. report that when an omental patch is used for simple closure, ulcer perforations larger than 5 mm are an independent risk factor for leakage. [13]

Hence presence of shock on admission delays post-operative recovery due to renal complications and respiratory complications and also affects the wound healing because of decreased perfusion. Delay in surgery causes increased bacterial peritonitis and led to septicemia and renal failure in post-operative period.

In this present study most common postoperative complications seen were wound infection in seventeen patients, chest infections in eleven patients followed by wound dehiscence in four patients and burst abdomen seen in three patients, leakage was seen in one patient and deep vein thrombosis in one patient

Duration of Perforated Duodenal Ulcer and Mortality:

According to recent research, there is a 2.4 percent adjusted drop in the likelihood of survival for every hour that passes between admission and surgery in cases with perforated peptic ulcer illness. According to their statement, the main reason for hospital delays in surgery appears to be diagnostic delays between admission and diagnosis. [14]

In this present study mortality was high in patients presenting after 24 hours of onset of symptoms.

In this present study out of 110 patients' presentation within 24 hours is associated with increased survival whereas mortality was high in patients presenting after 24 hours of onset of symptoms. Lack of awareness, lack of transportation and symptomatic treatment by their own or by local quacks were possible causes for delay.

A possible reason for strong association between delay and adverse outcome could be increased risk of developing severe sepsis.

Presence of shock and Mortality

In this present study shock at presentation is associated with increased mortality. In this present study out of the 12 members presented with shock death occurred in 8 members.

In this study patient age, interval between onset of symptoms that is from perforation to surgery, peritoneal contamination and shock at presentation are important determinants of morbidity and mortality in patients with perforated duodenal ulcer. These factors also increase the post operative morbidity increasing the hospital stay. Several studies shown that important Noval techniques and innovations for the treatment of peptic ulcer perforation.

Natural Orifice Transluminal Endoscopic Surgery (NOTES)

The idea behind NOTES ulcer closure is similar to that of open and laparoscopic surgery: a well-vascularized pedicle of omentumor falciform ligament is brought to the site of perforation and secured in place. The omentum is dragged into the duodenal lumen, the abdominal cavity is irrigated, and the endoscope leaves the existing perforation site using carbon dioxide insufflation. It is clipped into position, and insufflating the lumen can be used to test for leaks. Laparoscopic help was utilized if the ulcer itself was too little to allow the full endoscope to leave. Its limitations are inflammation of gastrointestinal wall and large size of perforation.

Transluminal Omental Patch Closure

In this procedure vascularisedomental pedicle is placed by endoscope through perforation that is clipped in place. It needs viable tissue not the friable wound edges.

Over the Scope Clip

In this procedure, endoluminal grasping of wound edges and placement of large clip with transmural grasp is done across the perforation. Indurated ulcer edges might be difficult to this manoeuvre because of insufficient pliability and no vascularized tissue (omental pedicle) is added. [15,16]

Self-expanding Metal Stents (SEMS)

In this technique ulcer is covered with self-expandable metal stents. It requires endoscopic skills and long-term results are uncertain in this procedure. [17]

Over Stitch Endoscopic Suturing System

This endoscopic suturing device is marketed commercially and utilises suturing mechanisms based on endoscopic caps and catheters. It fills up gaps of different diameters using flowing or interrupted sutures. [18]

U Clips

The laparoscopic repair of perforated peptic ulcer some of the drawbacks are length of operative time and laparoscopic surgeon's experience in intracorporeal knotting. [19] U-Clips simplifies the laparoscopic repair of perforated peptic ulcer, avoiding the need to perform knots and making the procedure safe and easier. It is suitable for perforations less than 10mm diameter.

Additional methods include the use of an acellular matrix plug, a biodegradable lactide-glycoside-caprolacton patch that is glued to the perforation to close it, suturing of the duodenal or stomach perforation, followed by the application of a patch coated in thrombin and fibrinogen and covered in an omental patch, and the injection of mesenchymal stem cells. [20,21] The experimental model includes a few of these methods.

It is important to investigate new methods in order to find less intrusive surgical repair options. In a similar vein, certain individuals with little symptoms may also gain from less intrusive treatment methods. It will take long-term follow-up studies with quality-of-life assessments to identify the safest and most effective management techniques as well as suitable selection criteria.

Conclusions

Increasing age at presentation, presence of Ischaemic heart disease, use of NSAIDs, patient's presenting with shock at the time of admission, late presentation to hospital had a poor prognosis.

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