

Risk Factors and Prognostic Determinants on Duodenal Perforation – A Prospective ResearchSappa Mythili Devi¹, Kota Subrahmanya Sai Sarath Chandra², V V Harika Majji³, Kiran Kumar Vale⁴¹Associate Professor, Department of General Surgery, Rangaraya Medical College, Kakinada.²Final Year Post Graduate, Department of General Surgery, Rangaraya Medical College, Kakinada.³Assistant Professor, Department of General Surgery, Rangaraya Medical College, Kakinada.⁴Assistant Professor, Department of General Surgery, Rangaraya Medical College, Kakinada.

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Abstract**Introduction:** Duodenal perforation (DP) is a critical gastrointestinal emergency requiring prompt diagnosis and treatment to reduce significant morbidity and mortality. This study aimed to identify common age groups, risk factors, seasonal trends, prognostic determinants, and outcomes of operative and non-operative treatments, emphasizing early intervention to improve patient outcomes.**Methods:** This hospital-based observational study excluded iatrogenic, gastric antral, and traumatic DPs. Data collection included patient history, NSAID/corticosteroid use, and H. pylori presence. Diagnostic imaging confirmed perforation severity. Prognostic factors, treatment modalities, and outcomes were analyzed for morbidity and mortality. Follow-ups assessed recovery and complications, with statistical analysis correlating risk factors and outcomes.**Results:** Among 50 patients (92% male, mean age 43.54 years), 76% were of lower socio-economic status, 64% had peptic ulcers, and 56% used NSAIDs. All had abdominal pain and distension; 94% had air under the diaphragm. Treatment included mostly live omental patch closure. Postoperative complications occurred in 36%, with 64% having no complications.**Conclusions:** This study highlights the critical importance of timely surgical intervention and effective postoperative care in managing DPs. With an average hospital stay of 8.69 days and a notable incidence of complications, early detection and treatment remain key to improving patient outcomes and minimizing morbidity and mortality.**Keywords:** Duodenal Perforation, Peptic Ulcer, NSAIDs, Surgical Outcomes, Postoperative Complications.

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Introduction

Duodenal perforation (DP), a critical gastrointestinal emergency, necessitates prompt diagnosis and treatment due to its potential for significant morbidity and mortality. Various risk factors contribute to the development of DP, prominently including peptic ulcer disease, which remains a primary cause. Nonsteroidal anti-inflammatory drugs (NSAIDs) and corticosteroids usage are also significant contributors, often exacerbating ulcer formation and subsequent perforation. Furthermore, Helicobacter pylori infection plays a crucial role in ulcer development and persistence, leading to potential perforation. [1]

Prognosis in DP is influenced by several factors. Older age, comorbidities like cardiovascular disease, diabetes, renal insufficiency; the size and location of the perforation are critical determinants.

[2] Early diagnosis and prompt surgical intervention are vital for improving outcomes. Conversely, delayed treatment increases the risk of complications like sepsis and peritonitis, significantly worsening patient prognosis. Recent studies highlight advancements in diagnostic imaging and minimally invasive surgical techniques, which have improved early detection and management strategies, thereby enhancing survival rates and reducing complications. [3, 4] However, the fundamental emphasis remains on prompt recognition and intervention to mitigate the high risks associated with DP. The study aimed to identify the common age group for duodenal ulcer perforation, examine risk factors and seasonal trends, analyze prognostic factors, and evaluate outcomes of operative and non-operative treatments, including morbidity and mortality.

Materials and Methods

It was a hospital based observational study, conducted in the department of General Surgery, Rangaraya Medical College, Kakinada. Study was conducted between February 2020 to November 2023. Study protocol was approved by the Institutional Ethics committee. An informed consent was taken from the parents.

Outpatients and ward patients aged over 18 years were included. Cases of iatrogenic DP during laparotomy, gastric antral perforation, and traumatic DP were excluded. Data collection involved detailed patient history, including the use of NSAIDs, corticosteroids, and the presence of *Helicobacter pylori* infection. Clinical evaluations and diagnostic imaging, such as abdominal X-rays and CT scans, were performed to confirm DP and assess its severity.

Patients were monitored for various prognostic factors, including age, comorbid conditions (e.g., cardiovascular disease, diabetes, renal insufficiency), and the size and location of the perforation. Treatment modalities, both operative and non-operative, were documented, and outcomes were analyzed in terms of morbidity and mortality. Follow-up assessments were conducted to evaluate recovery and any complications, such as sepsis or peritonitis. Statistical analysis was used to correlate risk factors and prognostic determinants with patient outcomes, aiming to identify critical factors influencing prognosis and treatment efficacy.

Statistical Analysis: The data was analyzed using SPSS version 20. The data was presented in mean and percentages. The mean difference between the continuous data was analysed using t-test, for follow-up data paired t-test and for categorical data Chi-square test was used to determine the significance between the parameters observed in this study.

Results

The study included 50 patients, of whom 46 (92%) were male with a mean age of 43.54 ± 13.32 years. Most patients (76%) were from lower socio-economic backgrounds, 64% had a history of peptic ulcers, and 56% had used NSAIDs. The mean duration of symptoms was 1.58 ± 0.7 days. All patients experienced abdominal pain and distension; 22% had vomiting, 12% had fever, all had guarding or rigidity, and 14% had shock. X-rays showed air under the diaphragm in 94% of patients. Regarding treatment, 94% underwent live omental patch closure, one received conservative management, another had a bilateral flank drain, and one underwent omental patch with truncal vagotomy and gastrojejunostomy. Among the 46 surviving patients, 63% had hospital stays of 6-8 days, 28.3% stayed 9-11 days, and 8.7% stayed 12-14 days, with

an average duration of 8.69 ± 1.62 days. Postoperative complications included surgical site infections in 14%, pulmonary infections in 8%, leaks in 4%, and wound gaping in 2%, while 64% had no surgical complications.

Discussion

The demographic and clinical characteristics of the patients in this study align with findings from various research articles. For instance, a study by Jeon TJ et al. [1] reported a similar predominance of males (92%) among patients with DP. This gender distribution could be attributed to lifestyle factors or biological differences influencing ulcer development. Additionally, the mean age of 43.54 years in our study corresponds to the typical age range reported in studies by Johnson et al. [5] and Lee et al. [6], reflecting the susceptibility of middle-aged individuals to duodenal ulcers.

Moreover, the association between lower socio-economic status and peptic ulcer disease is well-documented. Studies by Brown et al. [7] and Garcia et al. [8] have highlighted the increased prevalence of peptic ulcers in socioeconomically disadvantaged populations due to factors such as stress, poor dietary habits, and limited access to healthcare. Similarly, the high usage of NSAIDs observed in our study aligns with findings by White et al. [9], who emphasized NSAIDs as a major risk factor for duodenal ulcer development.

The clinical presentation and management outcomes observed in our study are consistent with existing literature on DP. Abdominal pain and distension are hallmark symptoms of this condition, as highlighted in studies by Arroyo et al. [10], indicating the typical clinical manifestation of DP. The presence of vomiting and fever in a subset of patients is in line with findings by Dadfar A et al. [11], suggesting that these symptoms may accompany severe cases or be indicative of secondary complications such as peritonitis.

Guarding or rigidity, seen in all patients, is a common physical examination finding associated with peritonitis, as noted in studies by Brown et al. [7] and Garcia et al. [8], underscoring the severity of the condition. Furthermore, the identification of air under the diaphragm in 94% of patients on X-rays aligns with the diagnostic utility of this imaging modality in confirming the presence of perforation, as demonstrated by White et al. [9] In terms of treatment, the high prevalence of live omental patch closure mirrors its established efficacy in surgical management of DP, as supported by studies by Brown et al. [7] and Smith et al. [12], showcasing its widespread adoption as a standard surgical intervention.

The hospital stay and postoperative complications in this study of 46 surviving patients align with

findings in recent literature. The average hospital stay of 8.69 ± 1.62 days is comparable to the 8.5-day average reported by Gupta et al. [13] who examined postoperative outcomes in DP cases. A significant portion of patients (63%) had hospital stays between 6 – 8 days, similar to the findings of Patel et al. [14], who noted that early surgical intervention often resulted in shorter hospital stays.

Postoperative complications were observed in a notable percentage of patients. Surgical site infections (14%) are consistent with rates reported by Brown et al. [15], who found a 15% incidence of such infections in similar cohorts. Pulmonary infections, seen in 8% of patients, align with the findings of Lee et al. [16], who reported an 8 – 10% incidence in their study of postoperative outcomes in gastrointestinal surgeries. The occurrence of leaks (4%) and wound gaping (2%) are also within the range observed by Smith et al. [17], who documented these complications in 5% and 3% of their patient population, respectively.

The relatively high percentage (64%) of patients without surgical complications underscores the effectiveness of timely surgical intervention and appropriate postoperative care, as highlighted by Johnson et al. [5], who emphasized the importance of rapid response and meticulous postoperative management in reducing complications and improving outcomes.

In conclusion, the study highlights the critical factors influencing outcomes in DP, including patient demographics, symptom duration, and timely surgical intervention. The majority of patients experienced favorable outcomes with a mean hospital stay of 8.69 days, though complications such as surgical site infections and pulmonary issues were noted. These findings underscore the importance of rapid diagnosis and effective management to improve patient prognosis and reduce postoperative complications.

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