Open Access

ORIGINAL ARTICLE

Frequency of Duodenal Perforation and its Major Etiological Factors

Muhammad Tariq Abdullah[1], S H Waqar[2], Sajid Ali Shah[1], Muhammad Tayyab Azam[3], Frogh e Elahi[3]

[1]Associate Professor, Department of General Surgery, [2]Professor & Head, Department of General Surgery
[3]Postgraduate Resident, Department of General Surgery

Surgical Unit I, Department of General Surgery, Pakistan Institute of Medical Sciences, Islamabad

ABSTRACT

Objectives: To determine the frequency of duodenal perforations and to assess the associated etiological factors.
Methodology: A cross sectional study was conducted at Department of General Surgery, Pakistan Institute of Medical Sciences Islamabad, from January 2018 to December 2021. All patients above 14 years age of either gender who had perforation in duodenum confirmed on laparotomy were included in the study. Pregnant females and patients with iatrogenic duodenal perforation were excluded. Detailed history regarding causative factors and clinical examination was documented on prescribed proforma. Operative findings on laparotomy were also recorded. Data was analyzed by using SPSS version 24.
Results: A total of 216 patients were studied with mean age of the study participants was 48.4±7.14 years. Male to female ratio was 3:1. with 77% were males. Patients from middle age (35 - 55 years) were mostly affected (86, 39.8%), followed by young age (20 - 35 years) patients (82, 38.8%). H pylori infection was the cause of duodenal perforation in 119 (63.9%) patients followed smoking in 76 (40.9%).
Conclusions: Middle age patients were commonly affected. H pylori infection was the most common cause of duodenal perforation followed by smoking. There is a significant association of age and socioeconomic status with the frequency of patients who had duodenal perforation due to peptic ulcers.
Keywords: Duodenum, Perforation, Peritonitis.

Authors' Contribution:
[1]Conception of the work idea, data collection, analysis and interpretation, drafting the manuscript, reviewing and final approval, accountable
[2,3]Data collection, analysis and interpretation, writing the manuscript, reviewing and final approval, accountable

Correspondence:
Dr Muhammad Tariq Abdullah
Associate Professor of Surgery
Department of General Surgery
Pakistan Institute of Medical Sciences
Islamabad
Email: drmta32@yahoo.com

Article info:
Received: 05 July 2024
Accepted: 09 September 2024

Cite this article. Abdullah MT, Waqar SH, Shah SA, Azam MT, Elahi FE. Frequency of Duodenal Perforation and its Major Etiological Factors. J Fed Med Coll 2024. 2024; 1 (1): 13-17.

Funding Source: Nil
Conflict of interest: Nil

Introduction

Duodenal perforation is a lethal condition if not treated timely. The literature reports a mortality rate that varies between 8% and 25%[1]. There are two types of duodenal perforation: confined and free. When intestinal contents spill freely into the abdominal cavity, a free perforation occurs, leading to widespread peritonitis. Contained perforation occurs when the ulcer creates a full-thickness hole, but free leakage is prevented by contiguous organs such as the pancreas that wall off the area. Patients with duodenal ulcer typically experience hunger or nocturnal abdominal pain. In perforation, it mostly result in an abrupt onset of excruciating upper abdominal pain. Imaging is crucial for early resuscitation since it aids in diagnosis. The risk of morbidity and mortality can be reduced through risk assessment and appropriate therapeutic alternative selection[2].

Peptic ulcer disease is a significant cause of duodenal perforation. Peptic ulcer disease affects four million people around the world each year[3]. Despite advancement in the management of peptic ulcer and increasing knowledge about its etiology, the incidence of peptic ulcer complications i.e. bleeding, perforation and obstruction have been reported unchanged in the range of 10-20%[4,5,6]. Main etiological factors include: *Helicobacter pylori* 80%[7], smoking 64%,[8] and use of non-steroidal anti-inflammatory drugs (NSAIDs) 2-4%[9]. All these are associated with initiation of ulcer, delayed healing, relapses, and complications of peptic ulcer disease. Other associated etiological factors include steroid use, alcoholism, stress, and a diet high in salt[10].

Because of lack of proper registry system, the epidemiology of duodenal ulcer and its perforation in Pakistan is difficult to describe. There is a trend of self-medication with poor compliance and patients do not seek medical advice. The high incidence of *H pylori* infection, increased use of NSAIDS and smoking leads to non-traumatic duodenal perforation which is a serious health issue.[11] Keeping in view the high morbidity and mortality associated with duodenal perforation due to failure of anti-ulcer drugs or non-compliance of patients or any concomitant factor or disease that predisposes to perforation, estimates of the disease need to be available in our setting. The objectives of the study were to determine the frequency of non-traumatic duodenal perforations and to assess the etiological factors associated duodenal perforations.

Methodology

An observational cross sectional study was conducted at Department of General Surgery, Pakistan Institute of Medical Sciences Islamabad from January 2017 to December 2020. Sample size was calculated using a 14% prevalence of non-traumatic duodenal perforation in peptic ulcers,[5,6] keeping 95% confidence level and 5% margin of error under WHO software for Sample size determination in health studies. Patients were selected by consecutive non probability sampling technique.

All patients of age 14 years and above of both genders who presented with peritonitis and had perforation in duodenum on laparotomy. Patients with iatrogenic duodenal perforation and pregnant females were excluded from the study.

Data collection procedure: The study was conducted after approval from hospital ethical committee. All patients from surgical OPD and emergency department meeting the inclusion criteria were recruited, after informed consent. A detailed history was taken and clinical examination was done. Blood samples for complete blood picture, serum electrolytes and serum enzyme-linked immunosorbent assay (ELISA) test to confirm *H. pylori* infection were taken on the same day. Erect Abdominal X-ray films was also be taken for diagnosing the gut perforation. All the tests and examinations were keenly observed and final decision was made under the supervision of a senior consultant surgeon with more than 05 years of experience. Operative findings on laparotomy were recorded. Any pus, free fluid were sent for culture and sensitivity and margins of the perforation and lymph node if found sent for histopathology. All data was recorded in the study proforma.

Data analysis procedure: SPSS software version 24 was used for the data analysis. Continuous variables like age were described as mean ± standard deviation. Categorical variables like gender, socioeconomic status, smoking, NSAID use, *H Pylori* infection, laparotomy findings, duodenal perforation are expressed as frequencies and percentages. To know statistical association of outcome variable i.e presence of non-traumatic duodenal perforation with different independent variables like age, gender, socioeconomic class, etc chi-square test used at

5 % significance level. Results are presented as tables.

Results

Data of 216 patients were studied. Mean age of the patients was 48.4±7.14 years ranged from 20 - 70 years. Demographics of the patients was showed in Table 1. Different age groups had strong association with socio-economic status (SES) (p=0.004) and literacy level of the respondents (p=0.003).

Table 1. Demographics of the patients. (n=216)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
20 - 35	84	38.8
36 - 55	86	39.8
> 55	46	21.4
Gender		
M	167	77.3
F	49	32.9
Literacy		
Illiterate	138	74.1
Literate	48	25.9
Profession		
Unemployed	154	71.3
Employed	62	28.7
Marital status		
Married	210	97.2
Divorced	04	1.8
Widow	02	0.9
Socioeconomical status	198	91.6
Lower Middle	17	7.8
Upper Middle	02	0.9
Poor		

Male to female ratio was 3:1; as 167 (77.3%) were males. 81.6% of the total male patients had duodenal perforations as compared to 44.6% of the total females and the association was highly significant (p=0.001). This meant that being a male was a high risk factor to have duodenal perforations.

In the current study it was found that 63.9 % of the study population having H. Pylori infection. Out of them Majority of them 68% were males while 32 percent were females. P value was highly significant (0.003).

Table 2. Major etiological factors for Duodenal perforation.

Causative Factors	Frequency (n)	Percentage (%)
H pylori infection	119	63.9
Smoking	76	40.9
Multiple factors	38	20.4
Use of NSAIDs	09	4.8

In the current study it was found that 40.9 % of the study population having history of smoking. Out of them Majority of them 98% were males while 02 percent were females. P value was significant (0.004). It was found in this study that majority of the perforations occurred in middle age while 77.9% of the participants suffered from it were males. Age was studied against the prevalence of Duodenal Perforations status and significant relationship of the two variables was found (p=0.001). Similarly, there was strong association was found between age groups and socio-economic status (p=0.004) and literacy level of the respondents (p=0.003). Persons with lower socio-economic status and lower educational status were found to be more having these ailments than the rest groups. Marital status was found to be significantly associated with perforations and 72.6% of the people having perforations were the married (p=0.003).

Different types of causative agents were also studied and it was found that 4.6 % of the study population having history of using NSAIDs. Majority of them 88% were females. 63.9% of the study population having H Pylori infection. Out of them Majority of them 68% were males while 32 percent were females. P value was highly significant (0.003). 40.9 % of the study population having history of smoking. Out of them Majority of them 98% were males while 2% were females. P value was significant (0.004). Finally in Around 21 percent cases of duodenal perforations, multiple factors were involved. Out of these 54 % were having H Pylori and Smoking factor, 34 percent were using cigarettes and NSIADs while in the remaining 11 percent all the three factors were present.

Discussion

Duodenal perforation, a potentially fatal condition, is not unusual in our region. A duodenal perforation can have several potentially fatal causes, including peptic ulcers, trauma, iatrogenic conditions, etc. To our knowledge, there aren't many publications comparing the results of duodenal perforation from these many causes with one another, primarily from the developing world, despite the fact that each of these causes is extensively covered in the literature[12]. Management is not standardized, since it primarily depends on the clinical situation and the surgeon's experience. Thus, in order to prevent catastrophes, early diagnosis and prompt treatment are necessary. Treatment delay is directly associated with morbidity and mortality in duonenal perforation.

In this study, we observed that the mean age was 48.4 years, and the male: female ratio was 3 : 1, which is in consistent with another study of Pakistan that reported a mean age of 49.23 years[13]. Few South Asian studies also found the similar mean age of 40-43.4 years and a high gender ration of 10.5:1[14,15]. However data of a study from Jordan showed 47.1% of patients below 30 years of age unlike our finding[16]. The present findings are also comparable to a study conducted in West African population, in which they reported a mean age of 45.5 years, and the male: female ratio at 4.8 : 1[17].

We also found in this study that majority of the perforations occurred in middle age while 77.3% of the patients were males. The most frequent aetiological cause leading to perforation was found to be duodenal ulcer, which also had the best prognosis. One of the main causes of duodenal perforation is peptic ulcer disease. Between 2 and 10% of patients with ulcers are thought to experience acute perforations of the duodenum. H. pylori infection and NSAID use are the two main causes of peptic ulcers and perforation. Chronic liver illness, smoking, hyperparathyroidism, and chronic renal failure—particularly during dialysis and transplantation—are additional risk factors. In all age categories, the incidence of duodenal and stomach perforations has grown due to the prevalence of H. pylori in the lower socioeconomic classes and the associated poverty, overcrowding, and inadequate hygiene, especially in the developing world[18].

The major etiological factors for duodenal perforation in the present study are H pylori infection followed by smoking and use of NSAIDs. These findings are similar with the other studies that showed the similar results. Similarly, there was strong association was found between age groups and socio-economic status (p=0.004) and literacy level of the respondents (p=0.003). Patients with lower socio-economic status and lower educational status were found to be more having these ailments than the rest groups. Marital status was found to be significantly associated with perforations and 72.6% of the people having perforations were the married (p=0.003). Different types of causative agents were also studied and it was found that 4.6 % of the study population having history of using NSAIDs. Majority of them 88% were females. 63.9 % of the study population having H Pylori infection. Majority of them 68% were males while 32 percent were females (p=0.003). 40.9 % of the study population having history of smoking. Out of them 98% were males while 02 percent were females, with significant P value of 0.004. Finally around 21% cases of duodenal perforations, multiple factors were involved. Out of these 54 % were having H Pylori and Smoking factor, 34% were using cigarettes and NSIADs while in the remaining 11% all the three factors were present.

Conclusion

Duodenal perforations are highly prevalent in middle age people and serves as a hidden burden of disease in lower socio-economic age people. Males are more prone to be suffering from this

and thus special care is needed to prevent them from this disease. H pylori infection and smoking are the commonest causes for duodenal perforation that are preventable.

References

1. Amini A, Lopez RA. Duodenal Perforation. [Updated 2023 Mar 13]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK553084/
2. Ansari D, Torén W, Lindberg S, Pyrhönen HS, Andersson R. Diagnosis and management of duodenal perforations: a narrative review. Scand J Gastroenterol. 2019;54(8):939-944. https://doi.org/10.1080/00365521.2019.1647456
3. Memon AA, Bhutto AA, Shaikh GS, Jokhio A, Soomro QA. Changing trend in topography of peptic ulcer perforation. JLUMHS. 2009;8(1):34-36.
4. Behman SW. Management of complicated peptic ulcer disease. Arch Surg. 2005;140:201-8. https://doi.org/10.1001/archsurg.140.2.201
5. Zelickson MS, Bronder CM, Johnson BL, Camunas JA, Smith DE, Rawlinson D, Von S, Stone HH, Taylor SM. Helicobacter pylori is not the predominant etiology for peptic ulcers requiring operation. Am Surg. 2011;77:1054-1060. https://doi.org/10.1177/000313481107700827
6. Snowden FM. Emerging and reemerging diseases: a historical perspective. Immunol Rev. 2008;225(1):9-26. https://doi.org/10.1111/j.1600-065X.2008.00677.x
7. Svanes C. Trends in perforated peptic ulcer: incidence, etiology, treatment, and prognosis. World J Surg. 2000;24:277-283. https://doi.org/10.1007/s002689910045
8. Arici C, Mesci A, Dincer D, Dinckan A, Colak T. Analysis of risk factors predicting (affecting) mortality and morbidity of peptic ulcer perforations. Int Surg. 2007;92(3):147-54.
9. Bertleff MJ, Lange JF. Laparoscopic correction of perforated peptic ulcer: first choice? A review of literature. Surg Endosc. 2010;24:1231-9.
10. Hermansson M, Ekedahl A, Ranstam J, Zilling T. Decreasing incidence of peptic ulcer complications after the introduction of proton pump inhibitors, a study of the Swedish population from 1974-2002. BMC Gastroenterology. 2009;9:25. https://doi.org/10.1186/1471-230X-9-25 https://doi.org/10.1007/s00464-009-0765-z
11. Dodiyi-manuel A, Wichendu PN, Enebeli VC. Presentation and management of perforated peptic ulcer disease in a tertiary centre in South Nigeria. J West Afr Coll Surg. 2015;5(3):36-48.
12. Bojanapu S, Malani RA, Ray S, Mangla V, Mehta N, Nundy S. Duodenal perforation: outcomes after surgical management at a tertiary care centre-a retrospective cross-sectional study. Surg Res Pract. 2020;2020:8392716. https://doi.org/10.1155/2020/8392716
13. Butt AM, Choudhary AK, Mughal MA, Nasir T, Zafar JB, Rehaman K. Frequency of duodenal ulcer perforation with radiological evidence of pneumoperitoneum. Pak Armed Forces Med J. 2011;61(2):211-3.
14. Arveen S, Jagdish S, Kadambari D. Perforated peptic ulcer in South India: an institutional perspective. World Journal of Surgery. 2009;33(8):1600-1604. https://doi.org/10.1007/s00268-009-0056-9
15. Gupta S, Kaushik R, Sharma R. The management of large perforations of duodenal ulcers. BMC Surgery. 2005;5:15. https://doi.org/10.1186/1471-2482-5-15
16. Elnagib E, Mahadi SE, Mohamed E, Ahmed ME. Perforated peptic ulcer in Khartoum. Khartoum Medical Journal. 2008;1(2):62-64.
17. Nuhu A, Kassama Y. Experience with acute perforated duodenal ulcer in a West African population. Nigerian Journal of Medicine: Journal of the National Association Resident Doctors Niger. 2008;17:403-406. https://doi.org/10.4314/njm.v17i4.37421
18. Weledji EP. An overview of gastroduodenal perforation. Front Surg. 2020;7:573901. https://doi.org/10.3389/fsurg.2020.573901