Prevalence of Helicobacter Pylori in Perforated Peptic Ulcer Cases – Can it be the Cause of Perforation?

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Abstract

Background: *Helicobacter pylori* infections have proven to be associated with gastritis and peptic ulcer, adenocarcinoma, gastric lymphoma. The objective of the study was to observe the presence or absence of *H. pylori* in perforated peptic ulcer disease by obtaining biopsy from ulcer margin for rapid urease test, giemsa staining. Methods: This is an observational study carried out in all cases of perforated peptic ulcer reporting in surgical wards, Emergency Department of the medical college during 2018-2020. Biopsy was taken from the ulcer margin and the tissue was subjected to histo-pathological examination and rapid urease test. Results: Of the 50 patients participated in our study, 45 (90%) happened to be male, 5 (10%) were female. 60% of the patients were positive for *H. pylori* and remaining 40% were negative for *H. pylori*. This is well above the usual prevalence in normal population of 45. Conclusions: In our study, frequency of *H. pylori* in perforated peptic ulcer cases was found to be 60% which proves that prevalence of H.pylori is high but there may be other contributing factors in perforated peptic ulcer cases, which need to be further evaluated.

Keywords: Giemsa, *H. pylori*, Peptic ulcer, Perforated peptic ulcer

Introduction:

Peptic ulcers are defined as erosions in the gastric (or) duodenal mucosa that extend through the muscularis mucosae.[1] In the earlier days, peptic ulcers were believed to be caused by stress, dietary factors and increased gastric acid secretion till as late as 1983, when Warren and Marshall discovered the association between Helicobacter pyloriand peptic ulcers. [2]

Approximately 50% of the world population is infected with H.pylori. [3] Range of prevalence declines from well- developed countries to developing nations. A systemic review of global prevalence showed figures as high as 48.5% having been infected with H.pylori. African countries rank highest with the prevalence of as high as 70.1%. [4]

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One of the major life threatening complication of peptic ulcer disease is peritonitis due to perforation of duodenal/gastric ulcer, which is managed by an emergency procedure of omental patch repair and peritoneal toilet to a definitive procedure (done conventionally) of vagotomy and gastrojejunostomy or pyloroplasty in the later stages.

Helicobacter pylori (H. pylori)

H.pylori is a gram negative and micro-aerophilic organism that can cause chronic gastritis, gastric, duodenal ulcers and gastric adenocarcinoma.[5] The role of H.pylori in the etiopathogenesis of chronic peptic ulcer has been well established, but its importance in the pathology of perforated peptic ulcer is still conflicting.

A number of methods to H. pylori infection have been developed and they are generally grouped as being "invasive" meaning that they require gastric tissue or mucus, or "non-invasive" requiring only blood, breath

or stool or analysis. Here, we discuss the rapid urease test (RUT) or RUT which is an invasive test in that it requires sampling of the gastric mucosa. The test provides indirect evidence of the infection by identifying the presence of a non-mammalian enzyme, urease, in or on the gastric mucosa and histo-pathological examination.

H. pylori was first cultured in 1983. The initial report described it as urease-negative. However, other laboratories attempting to replicate the initial finding correctly identified the organism was urease positive. [6] McNulty *et al.* adapted a standard laboratory test for urease activity in which a loop of culture is placed in a urea containing substrate with a pH indicator such as Christensen's 2% urea broth; Urease hydrolyzes the urea to produce ammonia and carbon dioxide. [7] The ammonia increases the pH leading to the colour change (from brown to pink). McNulty *et al.* showed that urease could be identified directly from gastric biopsies using this test thus eliminating the need for culture or histology. The original observation was followed with a large clinical trial published in 1989 in which 1,445 patients underwent testing for *H. pylori* using modified Christensen's urea broth.[8] They reported almost 100% specificity and 96% sensitivity in comparison with histology and culture.

The Rapid Urease Test (RUT) is an indirect test of the presence of *H. pylori* based on the presence of urease in or on the gastric mucosa. It has an advantage over serology in that it only detects the presence of an active infection. The test requires a sample of gastric mucosa or mucus that is added to a tube, gel, or other device which brings that sample into contact with urea and a method to detect the products of urea hydrolysis, ammonia or carbon dioxide. The discovery of *H. pylori* by Warren and Marshall in the pathogenesis of Peptic ulcer disease has revolutionized the treatment of the same. But its association with perforated peptic ulcer is still conflicting; with varied studies giving difference of opinion. [9,10]

Methods:

Source of data

A sample of 50 patients fulfilling the inclusion criteria were selected for this study from Department of General Surgery of L. G. Hospital, Maninagar, Ahmedabad attached to AMC Medical Education Trust between June 2018 and Jan 2020. It was a prospective observational study.

Inclusion criteria

Patients diagnosed with perforated peptic ulcer of ages 18-75 years, undergoing emergency laparotomy were included in our study.

Exclusion criteria

Exclusion criteria were patients who were on triple drug therapy for *H. pylori* for acute gastritis or any other disease; patient who showed septicemia, respiratory failure, congestive heart failure were excluded; patients with traumatic perforations and perforations due to malignancy. 50 patients fulfilling the criteria framed were included in our study after obtaining a written & informed consent, was elicited followed by general and systemic examination. A brief data on the special investigations done for the H. pylori study.

Rapid urease test: The biopsy specimen from the perforated peptic ulcer margin were placed in Rapid urease test broth (HiMedia) containing 2% urea solution with phenol dye red as indicator, the change in color to pink within 24 hrs was taken as positive. [11]

Giemsa staining: The biopsy specimen from the perforated ulcer margin were subjected to Giemsa staining and viewed under microscopy for the typical morphology of stained *H. pylori* organisms.

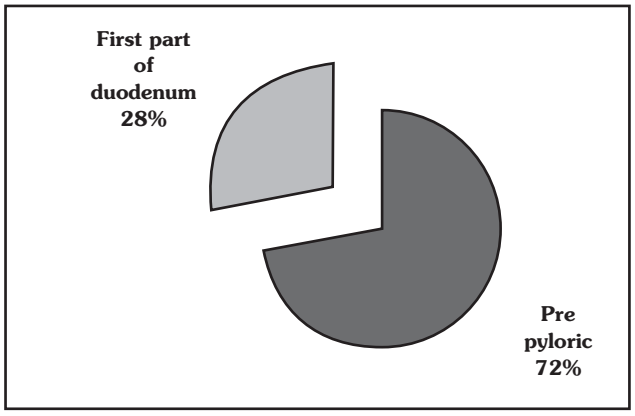
Results:

The present study was done as an observational study among 50 perforated peptic ulcer patients to find out the frequency of Helicobacter pylori infection in perforated peptic ulcer patients undergoing surgery in L. G. Hospital, Maninagar, Ahmedabad. Among the

total 50 participants in this study there were 13 (26%) participants in the age group of 31-40 years, 9 (18%) participants in the age group of 41- 50 years and 8 (16%) participants in the age group of 51-60 year. In the age range of 61-70 years, there were 7(14%), 3(6%) patients above 70 years of age. One (2%) patient was aged 9 years. Of all the study participants 45 (90%) patients were males and 5 (10%) patients of were females. In the current study of cases of perforated peptic ulcer, the age group and sex wise distribution was 1 (2%) male patients below 20 years of age. Between 21-30 years, there was 1 (2%) female and 8 (16%) male patients. Of the 13 patients in the age group of 31-40 years all 13 (26%) were males. In the age range of 41-50 years there were 2 (4%) females and 7 (14%) males. Same frequency was noted for age group 51- 60 years. In the age group of 61-70 years 7 (14%) were males. No female cases were recorded within one group above 70 years of age all 3 (6%) cases were males.

In this study of all the 50 patients with perforated peptic ulcer the chief clinical presentation was pain abdomen. Among all the study participants in (n=36) 72% of the site of peptic ulcer perforation was in pre pyloric region and for (n=14) 28% of patients the perforation was in the first part of duodenum (Figure 1).

Figure 1: Site of perforation



On biopsy with Giemsa staining, 66% (n=33) samples were positive for H. pylori (Figure 2) whereas 34% (n=17) biopsy samples were negative for H. pylori. Rapid urease test was found to be positive in 58%(n=29) of the perforated peptic ulcer cases for H. pylori and negative among 42% (n=21) of the cases (Figure3).

Figure 2: Proportion of positive cases of H.pylori by Giemsa stain

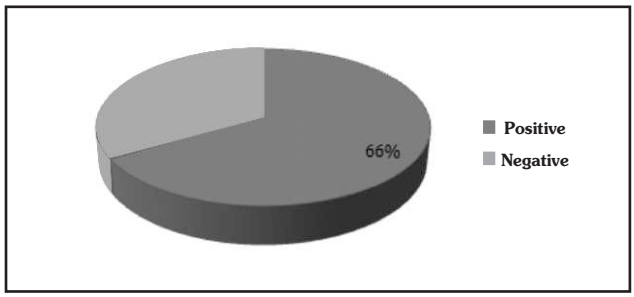
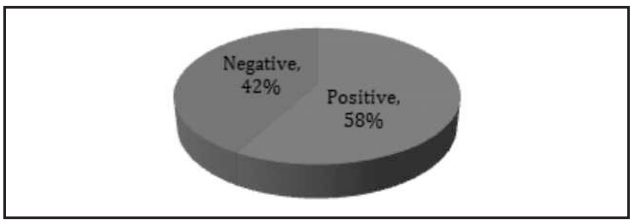
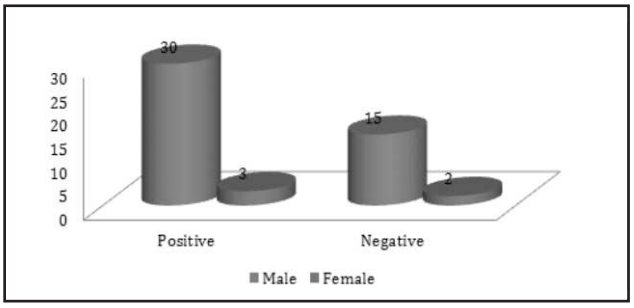


Figure 3: Proportion of positive cases of H.pylori by rapid urease test



In this study among 50 patients Giemsa staining and rapid urease test were positive in (n=24) 48% participants and both the tests were negative in (n=17) 34% of the patients. Rapid urease test was alone positive in (n=5) 10% of the cases. Among 33 cases who were positive for H. pylori infection (n=30) 90.91% of male and (n=3) 9.09% of female. (Figure 4).

Figure 4: Gender wise distribution of H.pylori cases



Discussion:

Perforated peptic ulcer still remains one of the major emergencies faced by general surgeons in day to day practice. Research for its prevention and cure has been carried out over a long time to reduce morbidity and mortality.

This study was conducted in the department of Surgery, at AMC MET medical college and hospital, Ahmedabad. 50 cases with Perforated Peptic ulcer in the age group of 20-70 years were included in the study. Patient who received treatment for *H. pylori* eradication were excluded from the study. All these cases were stratified according to age, sex, presenting symptoms, elicited signs, type of surgical intervention, histopathology and microbiological tests. During the 19 month period, 50 patients were enrolled in our study. Most of the patients were in the middle age group (30-50 years) as consistent with the other studies done by Dogra et al with the highest incidence in the age group of 31-40 years. [11]

Perforation in peptic ulcer was more common in males and comparatively less common in females. Our study also had similar findings with male preponderance of 90% and females 10%. This corroborates with the other studies by Reinbach et al, Khan et al, Aman et al, Dogra et al, Rehmani et al. [3,9,12-15] It is contrasting to the study by Kaffes et al, who found it to be more common in females. [16] Most common presenting symptom among the cases in our study was epigastric/ upper abdominal pain, almost all 50 (100%) cases had it. Guarding/rigidity were present in almost all cases. This is consistent with the other studies.[14]

Intraoperatively 72% patients had Pre-pyloric perforation, 28% patients had in D1 i.e., first part of duodenum. This is in contrast to the studies in the literature, like the study done by Shah et al which mentioned that most common site was first part of duodenum or pre-pyloric. [17]

All patients with perforated peptic ulcer included in our study underwent exploratory laparotomy with Graham's omental patch closure. No definitive surgery was undertaken in any of the cases. In our study, the frequency of *H. pylori* was found to be 66% among the 50 participants; showing high incidence of *H. pylori* infection in perforated peptic ulcer. These results are in agreement with studies by Reinbach et al and Chowdhary, whose studies showed 47% and 0% incidence respectively. [9, 18] This is in consistent with the various studies in the literature. For example, indigenous studies by Sebastian et al reported an infection rate as high as 83% in a small group of acute perforated peptic ulcer, Sharma et al found a prevalence rate of 61% among 44 patients from Chhattisgarh region. [19]

Other studies conducted in different parts of the world namely Debongie et al showed a prevalence of 56%, NG et al on the other hand, found a 70% infection rate, a study conducted in Hong Kong by Chu et al reported infection rate of 47%, thus a varied picture of incidence in different regions of the world has been noted by various works. [20,21]

Giemsa staining of biopsy

Giemsa staining of the biopsy samples in our study showed *Helical bacteria* in 33 (66%) out of 50 cases. This method has an accuracy rate of 78% in detecting *H. pylori*. [15] This method was considered gold standard and used in almost all studies for the detection of *H. pylori* in perforated peptic ulcer. [11, 12, 14,15,22,23]

Rapid urease test

Frequency of *H. pylori* by rapid urease test was found to be 58% (29 out of 50). This is a less commonly used method in various studies for detection of *H. pylori*. All biopsy proven studies had positive rapid urease test, but also had a few false positive. This is consistent with our study. Patients were followed up for a period of 6 months. Patient with *H. pylori* positive results were given Triple drug therapy for *H. pylori* eradication. No recurrence was documented in any of the 50 cases. No re-operation was necessary.

Thus in our study, association of *H. pylori* with perforated peptic ulcer was present, significantly indicating a different pathogenesis and risk factors in the natural history of perforated peptic ulcer. The prevalence of pre-pyloric ulcer more than the duodenal ulcer can indicate a different etiology associated with perforation in this community. In this context, a larger study with bigger sample size with inclusion of other confounding factors like use of NSAIDS, steroids, smoking and alcohol is indicated to establish the association between *H. pylori* or other factors with perforated peptic ulcer.

Conclusion:

According to our study the evidence of infection by *H. pylori* as shown histological evidence by Giemsa straining was 66% and by rapid urease test was 58%. Thus the frequency of *H. pylori* infections seems to be very high in the studied patient population of perforated peptic ulcer.

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