

Prevalence of helicobacter pylori infection in perforated duodenal ulcer in a rural hospital

Prabhu S.G.¹, Abraham G.²

¹Dr. Satish G. Prabhu, Professor and unit Chief, ²Dr. George Abraham, Assistant Professor, All authors are affiliated with the Department of General Surgery, MOSC Medical College, Kolencherry, Medical College Road, PO Kolencherry, Kochi, Kerala, India.

Corresponding Author: Dr. Satish G Prabhu, Professor and unit Chief, Department of General Surgery, MOSC Medical College, Kolencherry, Medical College Road, PO Kolencherry, Kochi, Kerala, India. Email: satish63g.prabhu@gmail.com

Abstract

Background: The association of Helicobacter pylori with uncomplicated peptic ulcer disease is well documented. The aim of this study was to observe the prevalence of Helicobacter pylori in duodenal ulcer perforation and to know the sensitivity and specificity of rapid urease test in detecting Helicobacter pylori on table. **Methods:** This retrospective observational study was conducted at the department of General Surgery, MOSC Medical college hospital Kolencherry Ernakulum for a period of twelve months from February 2015 to February 2016. A total of fifty cases were included in the study. After stabilization in the Emergency room they were taken up for laparotomy and perforation closure after on table Rapid urease test was done. Specimen from the perforation site was sent for histopathology examination by Giemsa staining. **Results:** Fifty patients with duodenal perforation were taken up for laparotomy and DU perforation closure was done after on table one-minute rapid urease test. A specimen from the perforation site was sent for pathological examination by Giemsa staining. 35 patients (70%) out of 50 patients were tested positive for Rapid urease test. Of these 35 patients 20 patients (57%) had a previous history of APD and 15 patients presented with duodenal ulcer perforation for the first time. The Sensitivity and specificity of rapid urease test was found to be 100%. **Conclusion:** The prevalence according to our study of H.pylori in DU perforation is 70% and the Rapid urease test was positive in those cases with a long duration of APD. The sensitivity and specificity of One-minute rapid urease test is almost 100%.

Key words: DU perforation, H.pylori, One minute Rapid urease test

Introduction

Perforated duodenal ulcer is one of the surgical emergencies which we come across in our Emergency department. Perforated DU (duodenal ulcer) is a common surgical emergency all over the world with a mortality rate up to 10-40% [1]. Worldwide the incidence of peptic ulcer disease is said to have fallen in recent years [2]. However, the incidence of perforated duodenal ulcers has either remained constant or has been increasing due to which there has been increase in the incidence of emergency surgery.

Perforation of the duodenal ulcer is commonly seen in the first part of duodenum and occurs in about 5% to 10% of patients with active ulcer disease [2]. Majority of the patients require surgery except for a very few

number of patients who have sealed off perforation. Mortality in perforated DU is around 15% as per literature review. Helicobacter pylori (H. pylori) is a gram-negative bacterium that infects almost 50% of people in developed nations and up to 80% in developing countries [3]. Prevalence of Helicobacter pylori is one of the risk factors for peptic ulcer disease.

The average prevalence of H. pylori infection in patients with perforated peptic ulcer is of only about 65–70%, which contrasts with the almost 90–100% [1]. There are many previous studies showing prevalence of H.pylori in duodenal ulcer perforation patients but none are available in the recent years [4]. Peptic ulcer disease continues to be a significant health and economic burden in low and middle-income countries [5]. Eradication of H. pylori after surgery has been proved to reduce recurrence rate and complications [6].

Manuscript Received: 28th July 2018
Reviewed: 6th August 2018
Author Corrected: 14th August 2018
Accepted for Publication: 18th August 2018

H.pylori infection of the gastric antral mucosa plays an important role in the development of duodenal ulcer disease' and is of particular importance in perforation [7]. According to the currently followed model of the pathogenesis of H. pylori related duodenal ulcer, colonization of duodenum by h. pylori is the critical final step responsible for the chain of events leading to the lesion [8].

Thus, presence of duodenal colonization might represent a very high-risk condition for the development of duodenal ulcer and subsequent perforation. This hypothesis has never been tested until now. This may be due to the fact that a reliable identification of H. pylori in the duodenum is considered difficult, as a low number of bacteria colonizes cattered are as of duodenal gastric metaplasia [8].

Dr. J R Warren and Dr. Barry Marshall are credited with the demonstration of Helicobacter pylori previously designated as Campylobacter pylori in patients with chronic gastritis and acid peptic disease [9]. The new name Helicobacter pylori were suggested in 1989. The genus name reflects the two morphological appearances of the organism, Helical in vivo and rod like in vitro. Ever since its isolation H. Pylori has been the subject of several double-blind studies which support the hypothesis that H. Pylori is a significant factor in the etiology of acid peptic disease and associated with 60- 90% of peptic ulcers [10].

MC Nulty et al were the first to identify H. pylori by the urease test, later many modifications like the CLO test and Rapid urease test by Arvind et al made the diagnosis of H. pylori easier and simpler [11]. H. pylori are a gram negative mobile "s" shaped bacterium which colonizes the mucous secreting epithelial cells of the gastro duodenum. It produces a variety of enzymes like urease, catalase, superoxide dismutase etc of which the most important is urease which is important in the etiopathogenesis and the diagnosis of H. pylori by simple chemical tests.

Several diagnostic methods can be employed for the detection of H. pylori such as non-invasive serological tests which measures specific anti H.pylori immunoglobulin's IgG and or IgA and invasive tests such as bacterial culture, histopathological examination of biopsy specimen with different stains and assays for urease activity [3]. The aim of the present study is to observe the frequency and association of H. pylori in DU perforation cases by rapid urease test done at the time of surgery, and histopathology of the specimen.

Materials and Methods

Study Setting: The study was conducted in department of General Surgery MOSC Medical College, Kolenchery

Study Design: Retrospective observational study

Study Period: Between February 2015 and February 2016 were included in this study.

Sample Size 50 cases of DU perforation with peritonitis who presented to the casualty

Exclusion Criteria: Patients with gastric ulcer perforation in prepyloric region or perforation in any other part of bowel were excluded from the study

Ethical Consideration: The study was approved by the institutional human ethics committee. Informed written consent was obtained from all the study participants.

Study Procedure: All the charts of the patients with perforation peritonitis were analyzed from the medical record department for operative notes. Case notes were identified based on diagnosis as well as surgical procedure done. Patients with perforated duodenal ulcer were selected and included in the study.

Patient details like age, sex, detailed history with emphasis on previous history of acid peptic disease, past medical history, medical treatment for acid peptic disease and physical examination were recorded. Plain X ray of the chest and abdomen (erect) and ultrasonogram of the abdomen findings were noted down into a proforma. Emergency laparotomy was done in all cases of DU perforation.

One minute Rapid Urease test of Arvind et al was done on table in all cases and a specimen was obtained for Histo-pathological examination from the mucosa at the perforation site. The test was performed by adding two drops of 1% phenol red to two ml of freshly prepared 10% w/v urea in deionised water in a test tube at pH 6.8. One minute rapid urease test detects the presence of preformed urea produced by H. Pylori in the specimen. The urease present hydrolyses urea in the solution with the production of ammonium ions which raises the pH. This pH change is detected by a pH indicator, phenol red which changes color from yellow at pH 6.8 to pink at pH 8. A color change from yellow to pink at the end of 1 minute is considered a positive reaction. A buffer is present in the medium to increase its stability and reduce false positive reaction. Histopathological staining and modified Giemsa staining was done later from the tissue excised.

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Patients tested positive for the Rapid urease test were treated with Bismuth salt+Amoxicillin+ Metronidazole combination (Triple drug therapy) or Amoxicillin + Metronidazole+Ranitidine. Upper Gastro-intestinal

endoscopy was done in the immediate post-operative period and later after two months and mucosal biopsy specimen was obtained for the demonstration of presence or absence of H pylori.

Results

All fifty patients with duodenal ulcer perforation and peritonitis were taken up for emergency laparotomy and on table one minute rapid urease test and mucosal biopsy from the perforation site were done. As shown in Table No.1 One minute rapid urease test was positive in a total of 35 patients (70%) and majority of the cases reported was in the fifth decade of the life followed by fourth decade group. The distribution of cases among gender is shown in table no.2 depicting majority of them being male 84% of cases.

Table No 1: Age wise distribution of DU perforation cases.

| Age | Rapid Urease test | | Total |
|-------|-------------------|----------|-------|
| | Positive | Negative | |
| 21-30 | 04 | NIL | 04 |
| 31-40 | 08 | NIL | 08 |
| 41-50 | 12 | 08 | 20 |
| 51-60 | 04 | 05 | 09 |
| 61-70 | 05 | 01 | 06 |
| 71-80 | 01 | 01 | 02 |
| 81-90 | 01 | NIL | 01 |
| | 35 | 15 | 50 |

Table No 2: Sex wise distribution of DU perforation for rapid urease test.

| Sex | Rapid urease test | | Total |
|--------|-------------------|----------|-------|
| | Positive | Negative | |
| Male | 30 | 12 | 42 |
| Female | 05 | 03 | 08 |
| | 35 | 15 | 50 |

20 patients had a previous history of acid peptic disease (57%) and 15 patients presented with duodenal ulcer perforation for the first time without a previous history of acid peptic disease (43%). Rapid urease test was negative in 15 patients (30%) and 10 patients among them had a previous history of acid peptic disease and were on treatment (67%) and 5 cases were without a previous history of acid peptic disease (33%).

It was found that all the 35 cases positive by rapid urease were also positive For H. pylori by histopathological analysis. None of the cases showed any intestinal metaplasia and 15 urease test negative were histopathologically negative too.

Thus the sensitivity and specificity of rapid urease test was found to be 100%.

Forty-five patients underwent laparotomy and perforation closure with live omental pedicle patch and five patients were treated with simple closure of the perforation with omental patch.

Post operatively the rapid urease positive patients were treated with H.pylori regimens and all the patients responded well and during the follow up period of about 1 year there was no recurrence.

Discussion

Prevalence of *H. pylori* in peptic ulcer disease is 60% - 90% and our study reveals prevalence of 70% which is same as reported by various studies [11]. Association of *H. pylori* and duodenal ulcer perforation has been reported to be as high as 92%, only few studies have evaluated the prevalence of *H. pylori* in patients suffering from perforated peptic ulcer. There are studies which suggest that other pathogenic factors other than *H. pylori* are associated with duodenal ulcer perforation [1].

In our study also about fifteen patients (30%) were tested Rapid urease test negative. The incidence of duodenal ulcer perforation is more in the males (80%) and the incidence of duodenal ulcer perforation is maximum in the 31-50 age group. Ulcer perforation incidence has been studied over an extended period in western Scotland, United Kingdom and Norway who have suggested similar trend of increased incidence rate among males [12]. In men, ulcer perforation increased until about 1950 and declined thereafter. In women the incidence was low and fairly stable until about 1950 from which time it increased. Increasing age among ulcer perforation patients has been observed during this period with declining incidence among the young and increasing incidence among the elderly [13].

Of the 50 patients with DU perforation studied for association of *H. pylori* 35 were positive for rapid urease test and confirmed by histo-pathological analysis (70%). Of the positive cases 20 patients were known acid peptic disease patients on treatment (57%) and 15 patients presented with DU perforation for the first time (43%).

These results are comparable to the rates mentioned in the literature 77-95% sensitivity was directly proportional to the duration of the symptoms. Rapid urease positive cases occurred in clusters over a period April-May in our study suggesting an infective etiology. This is comparable to the period mentioned by other studies [14].

All cases of rapid urease positive were positive for *H. pylori* by histopathology too. Sensitivity of biopsy rapid urease test is 100 %.

There were no cases which showed *H. pylori* by histopathology were negative for the rapid urease test. This suggests that specificity and sensitivity for rapid urease test approaches 100 which is to the common

observation. Marshall et al, McNulty et al have reported sensitivity for biopsy urease test as 98% and 96% respectively⁽¹²⁾. Intestinal metaplasia was not noticed in any if the rapid urease positive cases, however chronic inflammatory cells were demonstrated in all of them suggesting that association of *H. pylori* with long standing cases of acid peptic disease. Detection of *H. pylori* by rapid urease test and histopathology was equally efficient and accurate

Conclusion

The prevalence of *H. pylori* in DU perforation is 70% and was seen more in those cases with a long duration of APD. The present study shows that the risk of developing *H. pylori* related duodenal ulcer perforation is strongly increased in those patients where the organism is detected by rapid urease test in the duodenum. This finding may help us to devise strategies aimed at prevention of duodenal ulcer, the most common disease caused by *H. pylori* infection. The sensitivity and specificity of One minute rapid urease test is almost 100%

Acknowledgement- The Department of Pathology, M.O.S.C Medical College

Declaration

Conflict of interest: None declared.

Funding: Nil, **Permission from IRB:** Yes

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How to cite this article?

Prabhu S.G, Abraham G. Prevalence of *helicobacter pylori* infection in perforated duodenal ulcer in a rural hospital. *Surgical Update: Int J surg Orthopedics.* 2018;4(3):105-109.doi:10.17511/ijoso.2018.i03.02.

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