



## Peptic ulcer perforation peritonitis and PULP score

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**Abstract:** *Background:* Peptic ulcers are the defects found in the gastric or duodenal mucosa and extend through the muscularis mucosa. Approximately 4 million people are affected by peptic ulcer disease every year. *Material and Methods:* This prospective observational study was conducted at the Postgraduate Department of General Surgery, Government Medical College, Srinagar (a tertiary care center) over a period of two years from October 2020 to October 2022. The aim of this study was to evaluate the accuracy of PULP (Peptic Ulcer Perforation) scoring system in predicting postoperative morbidity and mortality in patients operated for peptic ulcer perforation in our hospital. *Results:* 40 patients formed our study group. Maximum number of patients affected were in the younger age group, with median age of 25 years with male predominance (97.5%). Smoking was present in 67.5%. Serum creatinine was raised (>1.47mg/dl) in 22.5% patients. 90% patients were categorized as low risk according to PULP Score. Mortality was 5%, with PULP score of 11 each. *Conclusions:* The prognostic predictors present in the PULP score are readily identified before surgery. The PULP score helps in accurate and early identification of high - risk patients with perforated peptic ulcer, and therefore assist in risk stratification and triage.

**Keywords:** Perforated peptic ulcer, PULP score, Helicobacter pylori.

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## INTRODUCTION

Peptic ulcers are recognized as the defects that occur in the gastric or duodenal mucosa and extend through the muscularis mucosa. They are classified as acute or chronic and are present due to an imbalance between mucosal defenses and acid or peptic injury. Marshall and Warren brought a revolution in the medical and surgical field by discovery of *Helicobacter pylori* as a causative agent of peptic ulcer perforation (PUP). PUP is present in about 2 to 10 % of peptic ulcers, and is one of the most important complications of peptic ulcer. Every year peptic ulcer disease occurs in about 4 million people around the world<sup>1,2</sup>. In a developing country like India, prevalence among age group 0-4, 10-19 and adults is 22%, 87%, 88%, respectively, and in southern parts of India it is 80%<sup>3</sup>. Approximately 98-99% of peptic ulcers are known to occur in either the duodenum or the stomach at a rate of 4:1. The anterior wall of the duodenum is mostly affected than the posterior wall, gastric ulcers are present along the lesser curvature. Most of the patients affected have a single ulcer. In approximately 10-20% of patients with gastric ulcer, a coexistent duodenal ulcer can be present<sup>4</sup>. There are three clinical phases in the process of PUP; consisting of chemical peritonitis / contamination (Phase 1), an intermediate stage that occurs after 6 to 12 hours because of dilution of irritating gastro-duodenal contents by peritoneal exudates (Phase 2) and, intra- abdominal infection/bacterial peritonitis(phase 3)<sup>5</sup>.

The Peptic Ulcer Perforation (PULP) score was put forward by MH Moller in the year 2011, for the purpose of risk stratification of morbidity and mortality<sup>6</sup>: (Table1)

Table 1: PULP Score

VARIABLES	POINTS
Age > 65 years	3
Co-morbid active malignant disease or AIDS	1

Co-morbid liver cirrhosis	2
Concomitant use of steroids	1
Shock on admission*	1
Time from perforation to admission > 24 hours	1
Serum creatinine > 130 mmol/l or > 1.47 mg/dl	2
ASA Score 2	1
ASA Score 3	3
ASA Score 4	5
ASA Score 5	7
<b>TOTAL PULP SCORE</b>	<b>0 – 18</b>

\* Shock on admission is defined as blood pressure <100mmHg and heart rate >100 beats per min. ASA; American Society of Anesthesiologists.

Peptic Ulcer Perforation Score is categorized as: low risk (PULP Score : 0 to 7, risk of mortality is ≤ 25%) , and high risk (PULP Score : 8 to 18, risk of mortality is > 25%).

### MATERIAL AND METHODS

This prospective observational study was conducted at the Postgraduate Department of General Surgery, Government Medical College, Srinagar (a tertiary care center) over a period of two years from October 2020 to October 2022. Ethical clearance was sought from institutional ethical committee.

#### The exclusion criteria consisted of:

- Perforation other than peptic ulcer.
- Patients undergoing procedures other than primary closure with omentoplasty.
- Sealed perforations.

All the suspected patients were admitted and a thorough clinical, laboratory and radiological evaluation was done. The patients were resuscitated as per their clinical and biochemical parameters and were posted for surgery after obtaining a written informed consent. The parameters as per the PULP scoring system were noted for statistical analysis. Post-operative morbidity / mortality, if any, were observed and noted. All the patients were put on triple therapy regimen (pantoprazole, clarithromycin, and amoxicillin or metronidazole) for *Helicobacter pylori*. After discharge, the patients were followed up at postoperative week 1, 3 weeks, 6 weeks and 12 weeks.

### RESULTS

Our study group comprised 40 patients. The age group commonly affected was 17 to 30 years, with median age of 25 years. There was male predominance in our study with 39 males and 1 female, with male to female ratio of 39:1. In our study group, 3 patients had hypertension, 1 patient had COVID 19 pneumonia, 1 patient had rheumatoid arthritis. 27 patients were smokers in our study. Patients usually had a short history of epigastric pain followed by generalized abdominal pain. 9 patients had history of NSAID intake. Serum creatinine was raised (>1.47mg/dl) in 9 patients (Table 2).

Table 2: Preoperative data

Parameter	Percentage
Sex	
Male	97.5%
Female	2.5%
Comorbid conditions	
Hypertension	7.5%

Covid 19 pneumonia	2.5%
Rheumatoid arthritis	2.5%
Smoking	67.5%
NSAID intake	22.5%
Serum creatinine > 1.47mg/dl	22.5%

In our study, 35 (87.5%) patients had perforation in first part of duodenum, 2 (5%) patients had in gastric body, 1 (2.5%) patient had perforation in pre pyloric region, 1 (2.5%) in lesser curvature and 1 (2.5%) in pylorus. 70% patients developed surgical site infection and 30% patients developed respiratory tract infections in our study. 32 patients had ASA score of 2, 3 patients had ASA score of 4, 3 patients had ASA score of 5 and 1 patient had ASA score of 3. Out of 40 patients, 36 patients were categorized as low risk i.e., PULP score of 0 to 7 and 4 patients were categorized as high risk i.e., PULP score of 8 to 18 (Table: 2).

Table 2: Score parameters

Parameter	Percentage
PULP Score : 0 to 7 (low risk)	90%
PULP Score : 8 to 18 (high risk)	10%
ASA Score 2	80%
ASA Score 3	2.5%
ASA Score 4	7.5%
ASA Score 5	7.5%

## DISCUSSION

In our study, we found that peak incidence of peptic ulcer perforation was between 21 to 30 years, with median age of 25 years. Chalya PL, et al in their study had median age of 28 years<sup>7</sup>. Najar RR et al, in their study of 44 patients had age group of 21 to 30 years as most commonly affected<sup>8</sup>. Khan S et al, studied 150 patients ranging from 20 to 60 years and 30 to 40 years of age group was most commonly affected<sup>9</sup>.

We also found that 98% were males and 2% were females, with male to female ratio of 39:1. Byakodi KG reported 88.37% males and 11.62% females in the ratio of 7.6:1<sup>10</sup>. One of the reasons of male predominance was smoking. Hypertension was most common comorbidity in our study (7.5%). Kim JM, et al in his study of 142 patients reported that hypertension was most frequent comorbid disease (27%)<sup>11</sup>. Mathur PN, et al in their study reported hypertension was present in 18% of patients out of 373 patients<sup>12</sup>.

Our study concluded that smokers were commonly affected (67.5%) than non-smokers (32.5%). Similar findings have been reported by Najar RR, et al<sup>8</sup>. Agrawal reported that 90% patients in their study group were smokers owing to environmental and behavioral factors<sup>13</sup>.

We found that NSAID intake was present in 22.5% of patients. Almost similar results were obtained by Ootani H et al where it was 28.4%<sup>14</sup>. Seow JG, et al reported that out of 601 patients who were operated for PUP, NSAID intake was present in 13.7% of patients<sup>15</sup>. Shah PH, et al reported that out of 50 patients, 8% had history of NSAID intake for joint and back pains<sup>16</sup>.

In our study, first part of duodenum was the most common site of perforation (87.5%), followed by gastric body (5%). A study conducted by Vishvakarma A revealed that the most common site of PPU was first part of duodenum (64.1%)<sup>17</sup>. Another study by Yoon JJ, et al concluded that in all patients perforation site was anterior duodenal bulb<sup>18</sup>. Nichakankitti N et al in their study reported that the most common site of PPU was pre-pyloric region (80%)<sup>19</sup>. Thorsen K et al (2011) reported that perforation was gastric in 72% and duodenal in 28% of patients<sup>20</sup>.

In PULP score, an increase in levels of serum creatinine is one of the strongest predictor of mortality. In our study, serum creatinine was raised in 9 (22.5%) patients and among those 2 (22.2%) patients expired. A study by Kurniawati I, et al concluded that serum creatinine was raised ( $>1.47\text{mg/dl}$ ) in 21 patients and among those 17 (80.95%) patients died<sup>21</sup>.

In our study, 90% of patients were categorized as low risk i.e.; PULP Score  $<7$ . Roy AK et al reported that out of their study group of 52 patients, 46 patients were categorized as low risk (88.46%), and 6 (11.53%) patients were categorized as high risk (PULP SCORE of 8 to 18) due to treatment delay of  $> 24$  hours, shock, higher ASA Score<sup>22</sup>.

We also noted that in our study there were two mortalities out of 40 patients (5%), owing to PULP score  $\geq 8$ . A study conducted by Saafan T, et al reported 0.7% mortality out of 152 patients due to rapid triage, laparoscopic repair of perforation and low mean patient age. Our study group being smaller in size compared to the study conducted by Saafan T et al could explain the higher mortality<sup>23</sup>.

## CONCLUSION

In conclusion, we have found that PULP score has a higher accuracy in predicting morbidity and mortality of patients. The prognostic predictors that are included in the PULP score can be readily identified prior to surgery. The PULP score can, therefore, assist in accurate and early identification of high - risk patients that present with perforated peptic ulcer, and thus assist in risk stratification and triage.

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