

## Factors Predicting Mortality in Perforation Peritonitis at a Tertiary Care Center in Nepal

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### ABSTRACT

#### Introduction

Perforation peritonitis is a common surgical emergency. Despite advances in surgical techniques, antimicrobial therapy and intensive care support, mortality due to this illness still remains high. To analyze various demographic and clinical parameters associated with mortality in patients undergoing surgery for hollow viscus perforation peritonitis.

#### Methods

A prospective observational study was conducted at the Surgical Gastroenterology Unit, Department of Surgery, Tribhuvan University Teaching Hospital, in patients undergoing surgery for perforation peritonitis over a period of 18 months. Demographic characteristics, physiological variables and laboratory values were obtained. End point of the study was patients' condition at discharge or in-hospital mortality. Univariate and multivariate analysis of various demographic, clinical and laboratory parameters were performed.

#### Results

Among 121 patients, mean age was 41.5±18.9 years (range of 16 to 87 years). There was a male preponderance (74.1%). In-hospital mortality was seen in 19 patients (17.0%). Age, female sex, pulse rate, blood pressure, white blood cell count, urea and creatinine were significant parameters associated with mortality. Multivariate logistic regression analysis of the variables found to be of significance from univariate analysis showed that only pulse, systolic blood pressure and creatinine were the independent variables associated with mortality.

#### Conclusion

Higher mortality was seen in elderly patients. Despite of male preponderance, larger proportion of females succumbed to their disease. Derrangement in vital parameters like pulse and blood pressure and renal function test had negative impact in survival.

**Keywords:** *Hollow viscus, mortality, perforation peritonitis*

### INTRODUCTION

Mortality associated with perforation peritonitis remains relatively high.<sup>1</sup> It is difficult to predict mortality at the time of presentation. However, there are certain demographic, clinical and laboratory parameters

regarded as high risk. Presence of these high risk factors may guide clinicians to be more watchful in such subset of patients.<sup>2</sup> Objective of this study was to identify various demographic, clinical and laboratory parameters associated with mortality in patients undergoing surgery for perforation peritonitis.

Table 1. Demographic and clinical parameters for survivors and non survivors

Parameters	Total n=112	Survivors n=93	Non survivors n=19	p-value
Age	41.5 ± 18.9	39.2 ± 18.7	53.2 ± 15.8	0.003
Male	83	73 (88.0)	10 (12.0%)	0.019
Female	29	20 (69.0)	9 (31.0%)	
Median duration of symptoms (days)	2.0	2.0	3.0	0.241
Pulse	104.1 ± 21.3	100.9 ± 19.2	119.6 ± 24.9	< 0.001
Systolic BP	112.0 ± 21.6	116.3 ± 19.9	90.7 ± 16.8	< 0.001

## METHODS

A prospective observational study was conducted at the Surgical Gastroenterology Units of Department of Surgery, Tribhuvan University Teaching Hospital, Kathmandu, Nepal, over a period of 18 months (July 1, 2011 to November 30, 2012). Ethical approval was obtained from the Institutional Review Board of Institute of Medicine. Informed consent was taken from all the patients before enrolling them into the study. All patients undergoing surgery for suspected perforation peritonitis were included in the study. Patients aged less than 16 years, discharged on request and patients in whom no perforation found during surgery were excluded from the study. Statistical analysis performed with SPSS 16.0 (SPSS, Chicago, Ill). Results expressed as mean ± standard deviation. T-test to compare difference between two groups. All statistical tests with  $P < 0.05$  considered statistically significant.

## RESULTS

A total of 121 patients underwent surgery for perforation peritonitis during the study period. Mean age of the patients was  $41.5 \pm 18.9$  years with range of 16 - 87 years. There was a male preponderance with male to female ratio of 2.9 : 1. 19 patients (17.0%) of the patient died.

Comparison of demographic and clinical parameters between survivors and non survivors are depicted in Table 1. Non-survivors were significantly older in

comparison to survivors. ( $53.2 \pm 15.8$  versus  $39.2 \pm 18.7$  years). Though male patients outnumbered female patients, there were a larger proportion of females among non survivors. However, on analyzing other confounding factors such as age ( $p = 0.295$ ) and duration of symptoms ( $p = 0.364$ ), the difference in survival was not significant. Similarly, the median duration of symptoms likewise did not vary statistically ( $p = 0.241$ ). Pulse rate in non survivors was  $100.9 \pm 19.2$  as compared to  $119.6 \pm 24.9$  in non survivors ( $p < 0.001$ ). Systolic blood pressure in survivors and non- survivors was  $116.3 \pm 19.9$  mmHg and  $90.7 \pm 16.8$  mmHg respectively ( $p < 0.001$ ). Hence, variation in vital parameters, such as pulse and systolic blood pressure was found to be significantly different between survivors and non survivors.

Comparison of laboratory parameters between survivors and non survivors is given in Table 2. Levels of hemoglobin, sodium and potassium were not found to be significantly different between survivors and non- survivors. White blood cell count was lower in the non- survivors ( $p = 0.048$ ). Levels of urea and creatinine were significantly elevated in the non survivors.

Non traumatic bowel perforation accounted for 63.4% of all patients. Mode of bowel perforation, whether non traumatic, penetrating or blunt injuries were not found to be associated with increased mortality ( $p = 0.068$ ). Duodenum was the commonest site of perforation which accounted

Table 2. Laboratory parameters in survivors and non survivors

Parameters	Total n=112	Survivors n=93	Non survivors n=19	p-value
Hemoglobin (g/L)	13.4 ± 2.7	13.6 ± 2.4	12.1 ± 3.6	0.26
WBC count (/cmm)	9422.3 ± 5394	9876.1 ± 5308.1	7201.1 ± 5400.0	0.048
Urea (mmol/L)	8.1 ± 6.2	7.0 ± 4.3	13.8 ± 10.2	< 0.001
Creatinine (μmol /L))	121.1 ± 68.3	108.4 ± 51.3	182.3 ± 102.0	< 0.001
Sodium (mmol/L)	137.75 ± 6.5	138.0 ± 6.5	136.7 ± 6.4	0.43
Potassium(mmol/L)	4.1 ± 0.7	4.1 ± 0.6	4.3 ± 1.0	0.311

Table 3. Site of perforation in survivors and non survivors

Site	Survivors	Non survivors
Stomach	6 (5.4)	2 (1.8)
Duodenum	34 (30.4)	5 (4.5)
Jejunum	7 (6.3)	1 (0.9)
Ileum	17 (15.2)	8 (7.1)
Appendix	18 (16.1)	2 (1.8)
Large bowel	8 (7.1)	1 (0.9)
Gallbladder	2 (1.8)	0 (0)

to nearly one third of the cases, followed by ileal and appendicular perforations. One third of the patients with ileal perforation succumbed to their illness. Similarly, the site of perforation likewise did not differ significantly in survivors and non survivors (Table 3).

Intraoperative blood loss did not show any correlation with survival. Multivariate logistic regression analysis done for the variables found to be significant from univariate analysis showed that only pulse, systolic blood pressure and creatinine were the independent variables associated with mortality. (Table 4)

## DISCUSSION

Overall mortality in hollow viscus perforation in various series ranged from 10.6 % to 36 %.<sup>3,6</sup> The results in the present series were comparable with most series with exception to Mulari, et al, who reported mortality of 36 %.<sup>4</sup> The reason for high mortality rate in Mulari series may be inclusion of only ICU patients.

As with present study, many other studies have found correlation between increasing age and mortality in perforation peritonitis.<sup>2,7,8</sup> Increasing age seems to be an important prognostic factor that may probably be mediated indirectly through latent or more severe co-morbidity, poor nutritional status, general fragility, and changed immune function.<sup>9</sup> Because of the fact that increasing age relates to high mortality, it has been given a high score in both the scoring systems.

Similarly, male preponderance in perforation peritonitis was also comparable with other series.<sup>5,7</sup> Higher proportion of male smokers which is a risk factor for peptic ulcer perforation maybe the reason for higher rate of perforation. Traumatic perforations resulting from physical assaults are also seen more in the male population. Several studies showed duration of symptoms to be a predictor of mortality.<sup>5,7</sup> Delay in presentation has been attributed to many factors. Low

Table 4. Independent variables found to be significantly associated with mortality from multivariate analysis

Variable	Coefficient	p value	Odds Ratio (OR)
Pulse	0.043	0.057	1.044
SBP	- 0.078	0.006	0.925
Creatinine	0.011	0.049	1.011

socioeconomic status, level of literacy and long distance needed for travel to reach a referral centre are the important factors causing delay in presentation. Svanes et al,<sup>10</sup> reported that delay in presentation more than 24 hours increased the mortality rate by seven to eight fold. However, in the present study, duration of symptoms did not differ significantly between survivors and non survivors.

There is a three-fold increased risk of mortality when patients are in shock on admission and the mortality approaches 50% in presence of septic shock.<sup>11</sup> Present study showed significant association between hypotension and increased mortality in perforation peritonitis similar to other studies.<sup>2,7,8</sup> Regardless of the cause, hypotension leads to diminished tissue perfusion and increased incidence of dehiscence at the repair site.

Laboratory parameters such as hemoglobin, sodium and potassium did not differ between survivors and non- survivors which correlates with published series.<sup>7,12</sup> WBC count was not associated with mortality in the study by Horiuchi, et al.<sup>12</sup> In the present series, though WBC count was a significant factor associated with mortality, multivariate analysis failed to establish it as an independent risk factor. Levels of urea and creatinine depicting the renal function had a strong association with mortality in our study as well as several other studies.<sup>2,7,8</sup>

Proximal site of bowel perforation was seen in a studies from South Asia.<sup>5,8</sup> Duodenal ulcer perforation was the commonest site in the current study. Smoking, especially among young males, has been hypothesized for higher proportion of peptic ulcer perforation.<sup>13</sup> Distal bowel perforation has been seen to be predominant in the western countries mainly due to higher prevalence of diverticular disease.<sup>14</sup> On the other hand, a Nigerian study has shown 58% typhoid perforations.<sup>15</sup> Hence, the site of perforation has been shown to vary in different geographical regions. Overall, age, sex, site of perforation, preoperative shock,

hypoglycemia, renal dysfunction and duration of symptoms have been reported as the determinants of mortality in patients with perforation peritonitis.<sup>7</sup> However, from the present study, only pulse, blood pressure and creatinine were found to be significant factors from multivariate logistic regression analysis associated with mortality.

## CONCLUSION

Approximately one fifth of the patients undergoing surgery for perforation peritonitis succumbed to their disease. Higher mortality was seen in elderly patients. Despite of male preponderance, larger proportion of females succumbed to their disease. Vital parameters like pulse and blood pressure were independent variables associated with mortality. Renal function test had a negative impact in survival.

## CONFLICT OF INTEREST

None declared.

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