

## To Predict the Prognosis in Patients with Perforative Peritonitis Using Mannheim Peritonitis Index and Multiple Organ Failure Score

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### Abstract

*Background:* Perforative peritonitis is one of most important infectious problems that a surgeon faces on a day to day basis. Despite advances in surgical techniques, antimicrobial therapy and intensive care support its management continues to be highly demanding. Early and objective classification of the severity of peritonitis using the Mannheim peritonitis index (MPI) and the Multiple Organ failure (MOF) score may help in selecting patients for aggressive surgical approach. *Aim:* Evaluating the prognostic value of Mannheim Peritonitis Index and Multiple Organ Failure score in patients with perforative peritonitis and predicting their outcome. *Methods:* Prospective evaluation of the MPI and MOF score was performed in 82 patients with peritonitis who underwent uniform surgical treatment from December 2013 to December 2014 in the Department of General Surgery, KIMS Hubli. Patients were followed up until death or discharge. *Results:* Overall in-hospital mortality rate was 18%. Patients with MPI scores of  $\leq 20$ , 21-29,  $\geq 30$  had a mortality of 5%, 28%, and 60% respectively with a mean MPI of 19.9 in the survivors and 29.06 among the expired patients. When Multiple Organ Failure score was analysed, it showed that mortality was only 5% if the score was less than or equal to 3. But, when it becomes more than 3, mortality reached 90%. *Conclusion:* The combined MPI and MOF score have a great impact on the prognosis of patients in perforative peritonitis. They help stratifying the patients according to risk category to minimise the complications postoperatively.

**Keywords:** Perforative Peritonitis; Mannheims Peritonitis Index; Multiorgan Failure Score; Prognosis; Outcome.

### Introduction

Perforative peritonitis is one of most important infectious problems that a surgeon has faced till today. There is paucity of data from India regarding its prognostic indicators, morbidity and mortality patterns. Despite advances in surgical techniques, antimicrobial therapy and intensive care support, management of peritonitis continues to be highly demanding, difficult and complex.

The prognosis of peritonitis and intraabdominal sepsis, particularly when multiorgan dysfunction develops remains poor. Early and objective classification of the severity of peritonitis may help in selecting patients for aggressive surgical approach [1]. Several scoring systems have been developed for this purpose that provides objective descriptions of the patient's conditions at specific points in the disease process which helps our understanding of these problems.

The Mannheim peritonitis index (MPI) based on analysis of 17 possible risk factors in patients with peritonitis; only eight factors were truly relevant to prognosis, MPI includes only clinical risk factors that are routinely documented preoperatively and intraoperatively [2].

Organ failure and dysfunction evolve in a patient with sepsis and hence organ function needs to be monitored in intensive care patients [3]. The Multiple Organ failure (MOF) score that grades patients on a three point scale includes dysfunction of pulmonary, hepatic, renal, cardiovascular and hematological systems [4].

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### *Aims and Objectives*

- Evaluating the prognostic value of Mannheim Peritonitis Index and Multiple Organ Failure score in patients with perforative peritonitis.
- Indicating the individual risk to select the patients who may require a more aggressive surgical approach.
- Be able to inform patient's relatives with greater objectivity and outcome of the treatment.

### **Methodology**

This observational study was conducted from December 2013 to December 2014 in the Department of General Surgery, KIMS Hubli. During this period, a total of 100 cases of perforative peritonitis cases operated on elective or emergency basis were included in the study.

Diagnosis of perforative peritonitis was made by eliciting detailed history, X-ray chest PA view showing air under diaphragm and/or ultrasonography of the abdomen.

Standard operative procedures were followed for different causes of perforative peritonitis and the MPI was calculated in immediate postoperative period. Relevant laboratory investigations were done to calculate the MOF score postoperatively.

Patients were followed up until death or discharge with mortality being defined as any death occurring during the hospital stay and morbidity assessed in terms of post-operative complications ranging from wound infection to organ failure.

### *Inclusion Criteria*

Patients included were 18 years of age or older, seen at the surgical department of KIMS, Hubli with diagnosis of perforative peritonitis confirmed during surgery.

### *Exclusion Criteria*

- Patients less than 18 years of age.
- The patients diagnosed and operated at other hospitals.
- Patients with primary peritonitis.
- Peritonitis secondary to trauma.
- Perforative peritonitis patients with head injury, chest injury and all fractures are excluded.

### **Results**

Based on the above inclusion and exclusion criteria, out of the 100 cases operated during the study period 82 were selected for the analysis, of whom 70 were male and 12 female patients (Chart 1). In our study, majority of the patients were in the age group of 20-30 years (Chart 2). The mean age of the study population being 44.33 years.

Most of the patients in the study presented with the symptom duration of 1-5 days (Chart 3). Duration of symptoms significantly affected the length of hospital stay by increasing the morbidity.

Duodenum was found to be the most common site of perforation, noted in 49 out of the 82 cases (Chart 4).

The procedure carried out depended on the site of perforation. The various procedures done were, primary closure, omental patch repair, appendectomy, cholecystectomy, resection anastomosis, right hemicolectomy (Table 1). In our study, omental patch repair constituted the majority procedures done.

52 patients developed complications post operatively which has been summarized in the figure (Chart 5), surgical site infection being the most common followed by pulmonary complications.

In present study, Mannheim Peritonitis Index was calculated in small intervals among the cases. Least score was 10 and highest score of 37 were noted in our study and summarized below in the figure (Chart 6). Minimum Multiple Organ Failure score of 0 and maximum score of 7.83 was noted in our study. Majority of the patients had Multiple Organ Failure score of < 1 as depicted below (Chart 7).

The MPI score was analysed with the mortality and morbidity and is depicted below in figure (Chart 8). It was noted that only 4 cases out of 60 cases expired when Mannheim Peritonitis Index was below 25. But, when MPI was more than 25 mortality significantly rose i.e 11 out of 18 cases. Even though the post-operative complications were randomly distributed, the severe complications like organ failure were noted in patients with high MPI (>25) and minor wound complications were noted in majority of the patients with low MPI (<25)(Chart 9 and Table 2).

MOF score was correlated with outcome of the disease, it showed that mortality was seen in 9 out of 10 cases when MOF score was more than 3, whereas only 4 out of 66 cases expired when MOF score was less than 3 (Table 3).

**Table 1:** Table showing distribution of sample by type of procedure

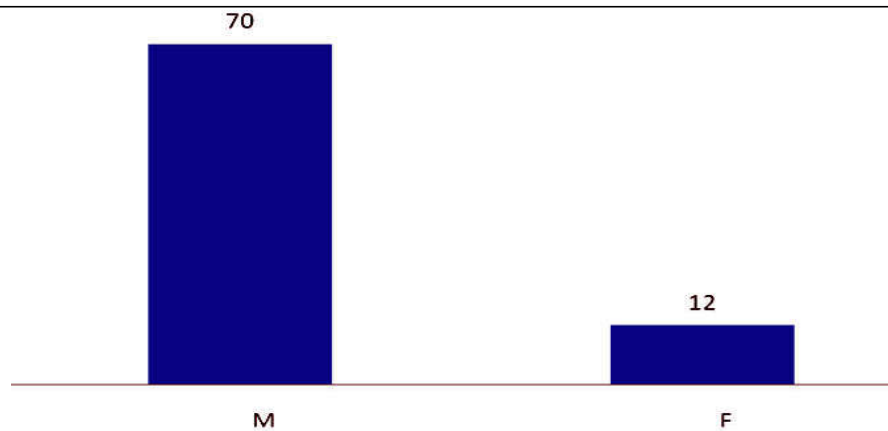
Serial Number	Type of Procedure	Frequency
1	Primary Closure	6
2	Peritoneal Lavage	1
3	Omental Patch Repair	55
4	Resection Anastomosis	8
5	Appendectomy	7
6	Resction and Colostomy	1
7	Right Hemicolectomy and Ileoileal Anastomosis	1
	Open Cholecystectomy	2

**Table 2:** Table showing distribution of Mannheim Peritonitis Index with postoperative complications

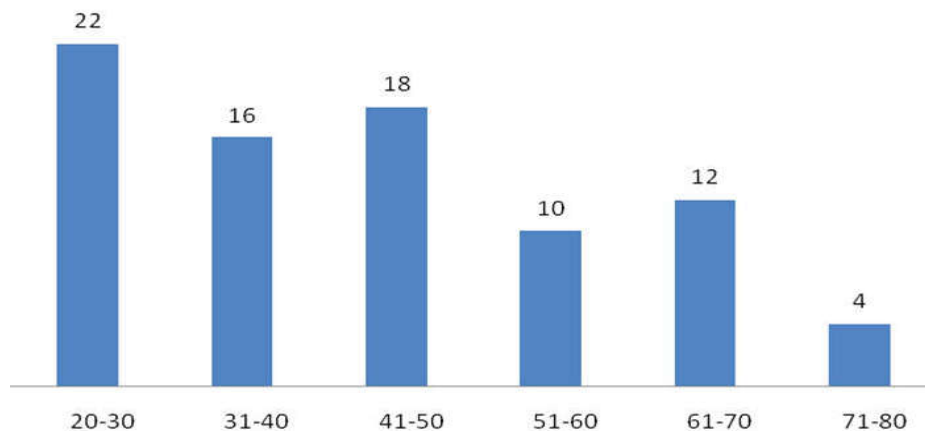
Mannheim Peritonitis Index	Present	Absent
10-14	3	9
15-19	21	18
20-24	11	12
25-29	10	1
30-34	5	0
35-39	2	0

**Table 3:** Comparison between multiple organ failure score and outcome

Mof Score	Survived	Died
0 - 1	52	1
1.1- 3	14	3
3.1 - 5	1	2
5.1- 7	0	4
>7	0	3



**Chart 1:** Bar chart showing sex distribution of the sample



**Chart 2:** Bar chart showing age distribution of the sample

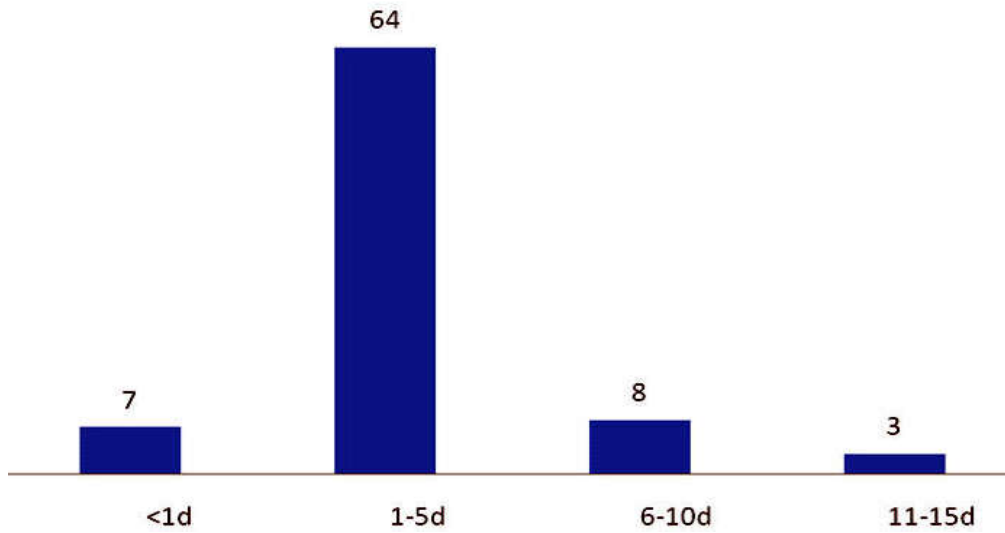


Chart 3: Bar chart showing distribution of duration of symptoms in days

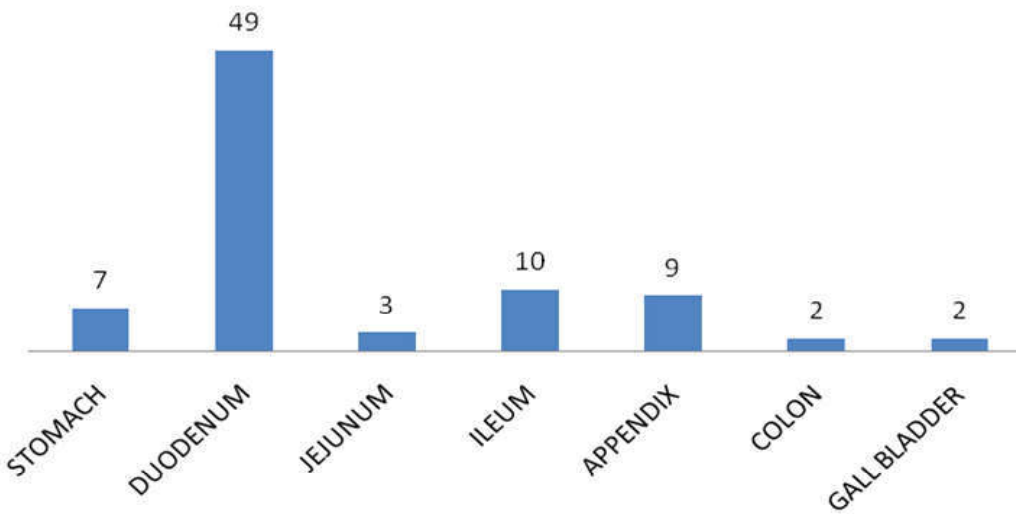


Chart 4: Bar chart showing distribution of sample by site of perforation

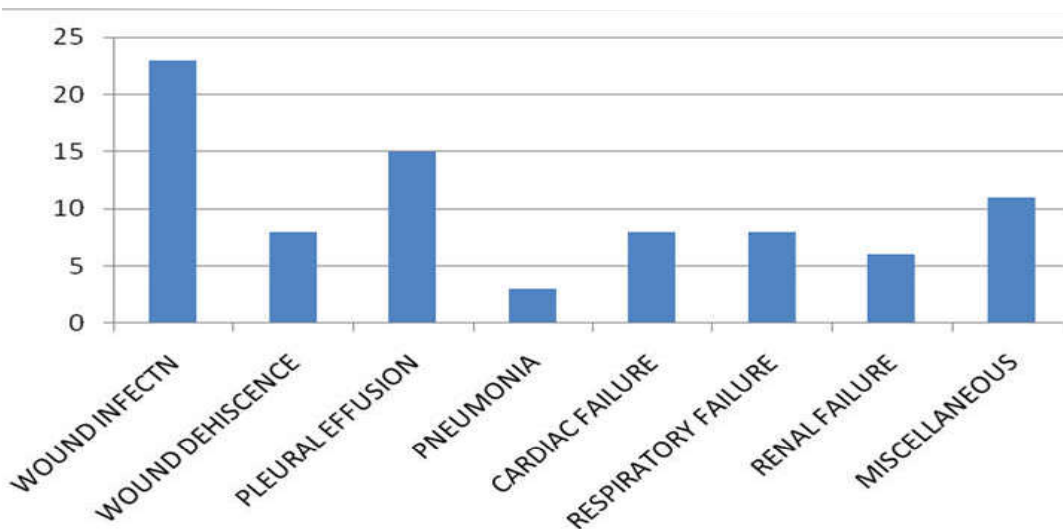


Chart 5: Bar chart showing distribution of sample by type of post-operative complication

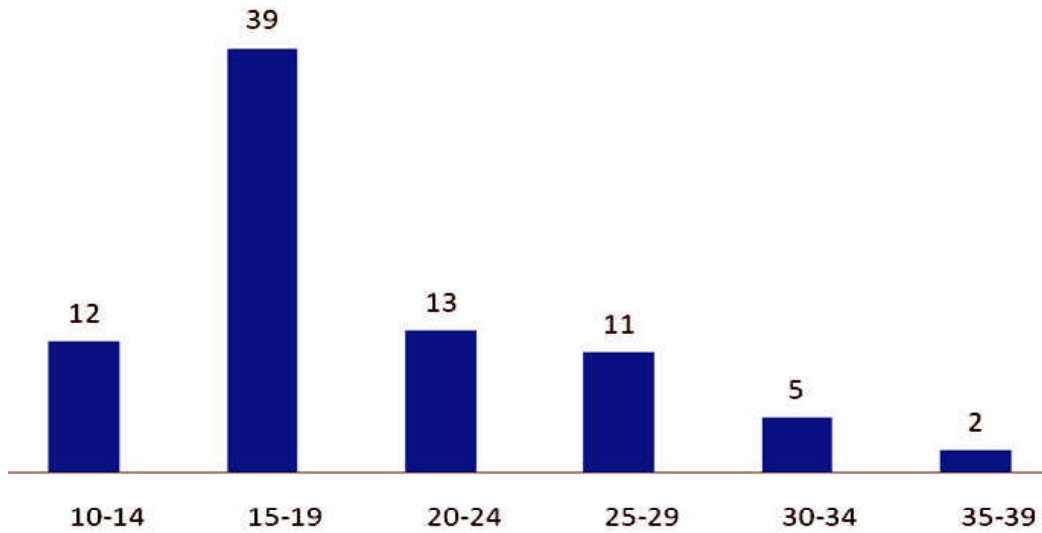


Chart 6: Bar chart showing distribution of sample by Mannheim Peritonitis Index

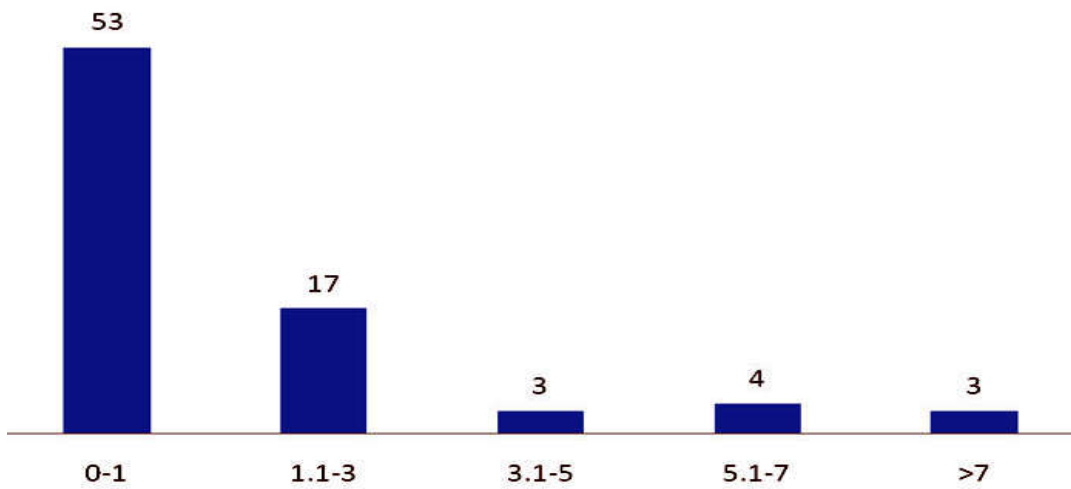


Chart 7: Bar chart showing distribution of sample by Multiple Organ Failure

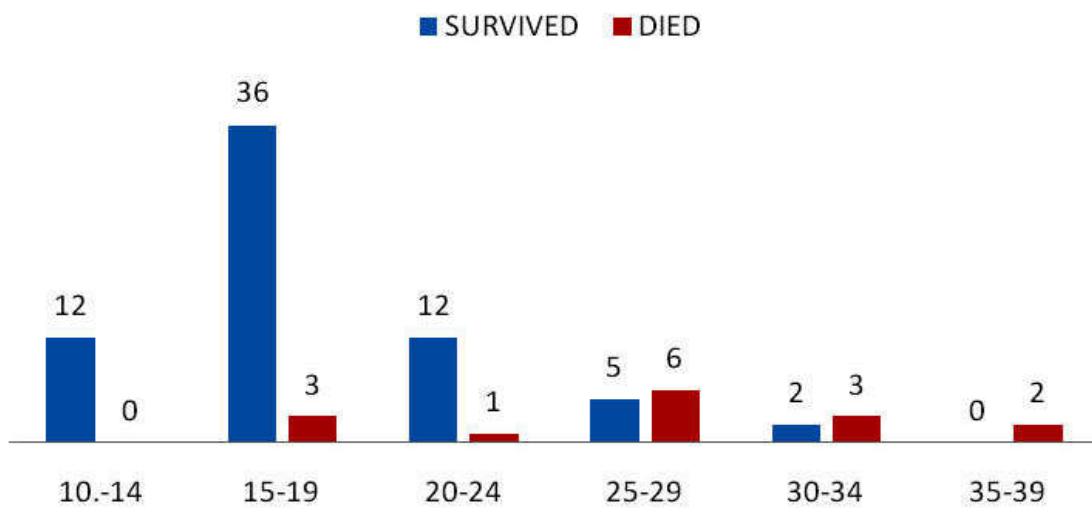


Chart 8: Bar chart showing distribution of Mannheim Peritonitis Index among outcome

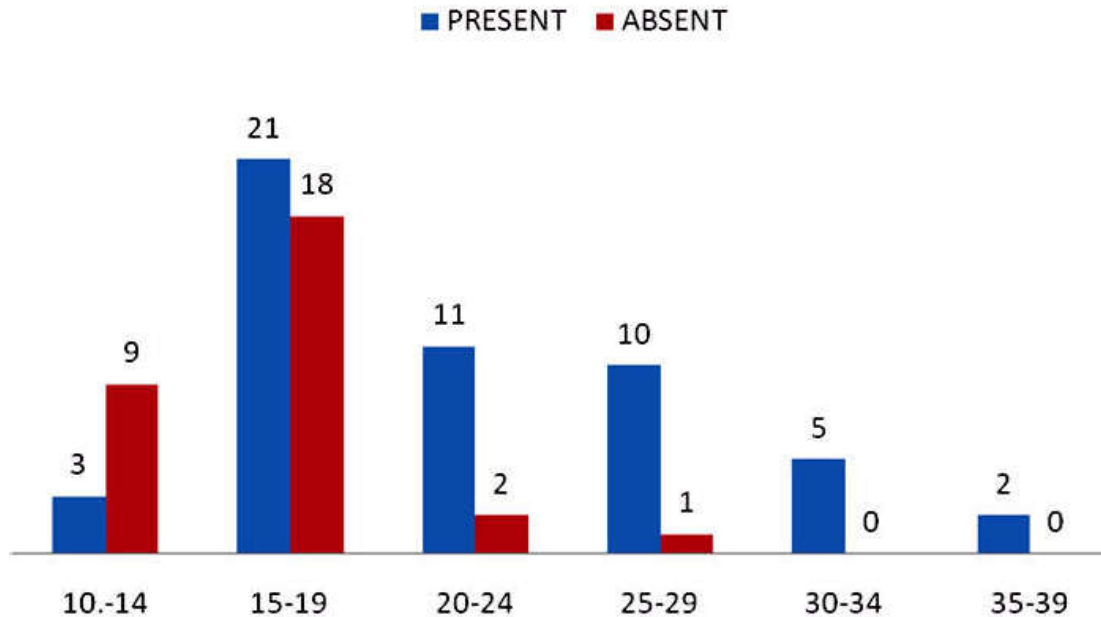


Chart 9: Bar chart showing distribution of Mannheim Peritonitis Index among post- operative complications

## Discussion

Peritonitis secondary to hollow viscus perforation is one of the commonest reasons for emergency surgery done even today. Various factors like age, sex, organ failure, malignancy, extent of peritonitis, type of contamination, site of perforation, surgical interventions are all known to influence mortality and morbidity. Effective preoperative management, timely surgery and proper post-operative care will decide the outcome.

Different studies have mortalities ranging from 6.4% to 17.5%. According to the literature MPI is an independent, objective and effective scoring system in predicting mortality and has advantages over the other scoring systems.

In a study conducted by Madhu et al., patients with MPI scores of  $\leq 20$ , 21-29,  $\geq 30$  had a mortality of 5%, 14%, and 50% respectively [5].

In a study conducted by Qureshi AM et al., score of  $\leq 20$ , 21-29,  $\geq 30$  had a mortality of 1.9%, 21.9% and 28.1% respectively. Mortality rate for MPI score more than 26 was 28.1% while for scores less than 26 it was 4.3% [6].

Malik AA et al., did prospective study using 101 consecutive patients having generalized peritonitis over a two-year period. In the MPI system, mortality was 0 in the group of patients with a score of less than 15, while it was 4% in the patients scoring 16-25 and 82.3% in those with scores of more than 25 [7].

In the present study, patients with MPI scores of  $\leq 20$ , 21-29,  $\geq 30$  had a mortality of 5%, 28%, and 60% respectively with a mean MPI of 19.9 in the survivors and 29.06 among the expired patients. The results of our study were comparable to the other studies.

## Conclusion

Our study proved that combined MPI and MOF score have a great impact on the prognosis of patients in perforative peritonitis. They help stratifying the patients according to risk category to minimise the complications postoperatively.

Higher scores are associated with poor prognosis and mandates intensive management and hence we recommend its use in clinical practice routinely.

## Acknowledgement

We would like to thank the Director, Principal, the Medical Superintendent and Head of the Department of General Surgery of KIMS hospital, Hubli for their help in completing this study

*Informed Consent* was taken from the patients for publication of photographs in a scientific journal according to the guidelines given in the Helsinki Declaration, 1964 and its later amendments.

### *Conflict of Interest*

All authors i.e Dr. Shilpa Huchannavar, Dr. Sandeep KS and Dr. Nishanth Lakshmikantha declare that they have no conflict of interest whatsoever.

*Ethics committee approval* was taken for publishing this case report from the institutional ethics committee of KIMS, HUBLI and all ethical standards were adhered to according to the Declaration of Helsinki, 1964 and its later amendments.

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