

Original article:

A descriptive observational study of assessment of severity of peritonitis using Mannheim Peritonitis Index

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Abstract:

Introduction: Inflammation of the peritoneum caused on by specific or widespread infections is known as peritonitis. One of the most typical infections and a major problem that a surgeon deals with is peritonitis.

Material and methods: Total of 65 patients with peritonitis due to hollow viscous perforation who presented to Government Medical college, Miraj from 1st January 2021 to 31st July 2022.

Results: 66.66% of patients with > 29 had some form of pulmonary complication, which was only about 13.33% in patients with score < 21(Table 8). The pulmonary complication in the form of post operative pneumonia, atelectasis, which required continuous monitoring of oxygen saturation, nebulization, higher antibiotics, analgesics and hence lead to longer post operative recovery were significantly higher as the score increased.

Conclusion: A scoring system to estimate the risk of morbidity and mortality following emergency surgery has been tried on numerous occasions. Some scoring systems offer a prognosis that comes close to the reported mortality rate for the cohort, but none are reliable enough to rely on when taking into account a specific patient. We can gauge the likelihood that patients will survive by assessing the severity of the illness early on utilising MPI. Death rate in the current study was zero for MPI scores under 21, zero for MPI scores between 21 and 29, and fifty percent for MPI scores over 29, which is helpful in pre-operative prognostication of patients based on MPI values. When forecasting the course of peritonitis, MPI is an easy-to-use and reliable approach.

INTRODUCTION

Inflammation of the peritoneum caused on by specific or widespread infections is known as peritonitis. One of the most typical infections and a major problem that a surgeon deals with is peritonitis. The mortality rates of perforation peritonitis remain high, ranging from 5.6% to 56% [1-4], in spite of surgical treatment, intensive care treatment, advancements in antimicrobial therapy, and a thorough understanding of the pathophysiology. Therefore, early prognostic evaluation of abdominal sepsis is advised to identify high-risk patients for more aggressive therapeutic interventions and to categorise the disease severity. Early intervention is always advised when treating peritonitis [1,5]. Surgery is the mainstay of treatment. To forecast the course of peritonitis patients, many grading systems have been utilized. These scores can help determine the priority of a patient's care and therapy as well as the prognostic factors that influence morbidity and mortality in peritonitis patients. Several scores, such as the MPI, APACHE II score, POSSUM (Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity) [6-8], Sequential Organ Failure Assessment (SOFA) [9, 10], and others, have been developed and investigated over the years.

There is no known (recorded) infection source for primary peritonitis. Infection typically spreads through male middle ears, upper respiratory tract infections, or lower genitals through fallopian tubes.[11]

Any intraabdominal bowel or other visceral pathology, such as perforation or appendicitis, can cause secondary peritonitis. The most frequent type is E. coli (70%) organism in question [13, 14]

PERITONITIS IS THOUGHT TO PASS THROUGH THREE PHASES

PHASE 1: Rapid clearance of impurities into the bloodstream from the peritoneal cavity. Stomata in the diaphragmatic peritoneum allow the infected peritoneal fluid to exit and enter lymphatic lacunae for absorption. Through the substernal nodes, lymphatic fluid enters the main lymphatic duct. Gram negative facultative anaerobes are mostly involved in the resulting septicaemia, which is associated with a significant morbidity.

When aerobes and anaerobes come into interaction with the host complement and phagocytes, they interact synergistically. With the aid of the alternative and lectin pathways, the complement is activated by the classical pathway. In order to promote opsonization and phagocytosis, complement and the phospholipid surfactant that the parietal mesothelial cells generate collaborate. Due to their ability to secrete proinflammatory mediators, peritoneal mesothelial cells play a crucial part in the cell signalling pathway that attracts phagocytes to the peritoneal cavity and causes mast cells and fibroblast in the submesothelium to become more active.

PHASE 3: The host's defences try to contain the infection locally by producing fibrinous exudates that trap bacteria in their matrix and stimulate the activity of local phagocytic effectors. Furthermore, it facilitates the growth of abscesses.

Mannheim Peritonitis Index

Mannheim Peritonitis Index	
Risk factor scores	
Age > 50 years	5
Female sex	5
*Organ failure	7
Malignancy	7
Preoperative duration of peritonitis > 24 h	7
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudates	
Clear	0
Cloudy, purulent	6
Faecal	12
*Kidney failure	Creatinine level > 177 µmol/L or Urea level > 167mmol/L or Oliguria 20ml/hour
*Pulmonary insufficiency	PO ₂ < 50 mmHg or PCO ₂ > 50 mmHg
*Intestinal obstruction/paralysis	> 24hours or Complete mechanical ileus,
*Shock	Systolic BP<90mm of hg, MAP<60mm of hg

MATERIAL AND METHODS:

Total of 65 patients with peritonitis due to hollow viscous perforation who presented to **Government Medical college, Miraj** from 1st January 2021 to 31st July 2022.

Inclusion Criteria:

- All those adult patients (age 18 and above of both gender) with clinical suspicious and investigatory support for the diagnosis of peritonitis
- Patient who gives written informed consent.

Exclusion Criteria

- Patients with associated vascular, neurogenic injuries were exclude from the study.
- Patient who does not give written informed consent

Data collection

After obtaining approval from Ethical Committee and informed consent was obtained from patients. Diagnosis of peritonitis due to hollow viscous perforation was made by history and clinical examination. All required biochemical investigations available in institution were done on admission and relevant clinical details were noted. Radiography of chest and abdomen suggestive of intestinal perforation was done. Standard operative procedures were followed for different causes of perforative peritonitis. Mortality was defined as any death occurring during the hospital stay. Morbidity was assessed in terms of post-operative complications such as Pneumonia or lung atelectasis, Wound infection, Acute respiratory distress syndrome, Acute myocardial infarction or heart failure, Intra-abdominal collection, Acute renal failure and urinary tract infection.

Once diagnosis of peritonitis had been determined by operative findings, the patient was enrolled into the study. Using history, clinical examination and lab values risk factors found in MPI were classified according to values indicated and individual variable scores were added to establish MPI score. The cases were first grouped into three, as described by Billing: those below 21 pts, between 21-29 pts, and those above 29 pts. In addition to personal data such as name, age, sex, etc., the following information was registered: file number; dates of

admission and discharge from the hospital; days hospitalized; date of surgery and information related to illness (surgical findings, medical treatment and evolution of illness). Patient evaluation was followed, occurrence of complications and discharge due to improvement or death. Time elapsed from initial diagnosis to moment of event (death or discharge from hospital) was determined. Outpatients follow up was continued for 30 days to establish perioperative morbidity and mortality. The minimum possible score was zero, if no adverse factor were present, and maximum was 40 if presence of all were confirmed. Analysis was done with each variable in the scoring system as an independent predictor of morbidity or mortality and the scoring system as a whole.

Statistical analysis:

The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, version 21.0. For statistical significance, p value of less than 0.05 was considered statistically significant.

RESULTS:

A total 65 patients with hollow viscus perforation were studied in our institute. Out of which 28 persons were above 50 years and 37 were below 50 years. The mean age of study group is 47.96 years. In our study incidence of male sex was 62 % while that of female sex was 38%. 12 patients presented with in 24 hr of onset of symptoms while 53 patients presented after 24 hr. 77% of the patients presented with generalizes peritonitis while 23% presented with localized peritonitis. In present study, Gastric perforation was most common with 24 patients and 4 patients had colonic perforation. 22 patients presented with organ dysfunction involving renal and respiratory system.

Table 1: Patients characteristics

Patient characteristics		Numbers	Percentage
Age	18-19	5	7.70%
	20-29	7	10.77%
	30-39	8	12.31%
	40-49	17	26.15%
	>50	28	43.07%
Sex	Male	40	61.53%
	Female	25	38.47%
Duration of presentation	<24hrs	12	18.46%
	>24hrs	53	81.56%
Type of peritonitis	Generalised	50	76.92%
	Localised	15	23.08%
Site of Perforation	Gastric	24	36.92%
	Duodenal	12	18.46%
	Ileal	16	24.61%
	GB	1	1.54%

	Appendicular	8	12.31%
	colon	4	6.15%
Organ failure	Yes	22	33.85%
	No	43	66.15%
Malignancy	Yes	4	16.16%
	No	61	93.84%
Mortality	Yes	12	18.47%
	No	53	81.53%

Table 2: Risk factors of MPI in three intervals studied to mortality

Risk factor MPI group	Mortality					
	<21		21-29		>29	
	No of patient	Died	No of patient	Died	No of patient	Died
Age <50	23	0	7	0	4	2
Age >50	5	0	6	0	10	10
Male	23	0	5	0	12	9
Female	5	0	8	0	11	3
Presence of organ failure	0	0	1	0	21	12
Absence of organ failure	28	0	12	0	3	0
Presence of malignancy	0	0	0	0	44	2
Absence of Malignancy	28	0	13	0	20	0
Time >24 hrs	16	0	11	0	24	12
Time <24 hrs	12	0	2	0	0	0
Non-colonic origin	26	0	13	0	22	10
Colonic origin	2	0	0	0	2	2
Generalised peritonitis	13	0	13	0	12	12
Localised peritonitis	15	0	0	0	0	0

Exudate-clear	7	0	0	0	0	0
-purulent	19	0	13	0	22	10
-feculent	2	0	0	0	2	2

Table 3: MPI Score and outcome

Outcome		MPI Scores		
		<21	21-29	>29
		Frequency	Frequency	Frequency
Mortality	Yes	0	0	12
	No	28	13	12
complication	Yes	12	6	14
	No	16	7	10
Hospital stay	<12 days	19	6	16
	>12 days	9	7	8

The duration of hospital stay is good measure of morbidity of patients due to peritonitis. In our study group, the average stay of patient in our tertiary care 12 days approximately. among these 23 patients stayed in the hospital for more than 12 days (Table 13). We also found that higher the score more will be the complication like wound and pulmonary complications and higher the score their hospital stay will be longer. Presence of secondary infections, malnutrition, delayed presentation contributes for longer period of hospital stay and associated increased morbidity in our study group.

Table 4: Pulmonary complications in MPI groups

Pulmonary complication	<21	21-29	>29	Total
Yes	4	6	20	30
	13.33%	20%	66.66%	100
No	24	7	4	35
	68.57%	20%	11.43%	100
Total	28	13	24	65

66.66% of patients with > 29 had some form of pulmonary complication, which was only about 13.33% in patients with score < 21(Table 8). The pulmonary complication in the form of post operative pneumonia,

atelectasis, which required continuous monitoring of oxygen saturation, nebulization, higher antibiotics, analgesics and hence lead to longer post operative recovery were significantly higher as the score increased.

Table 5: Comparison of wound complication in MPI groups

Surgical site infection	<21	21-29	>29	Total
Yes	5	8	13	26
	19.23%	30.76%	50%	100%
No	23	5	11	39
	58.97%	12.82%	28.21%	100%
Total	28	13	24	65

50% of the patients with scores > 29 developed wound related complications in the post operative period which was about 30.76% in patients with scores 21- 29 and about 19.23% in patients with scores < 21. The post operative complications were significantly higher in the group scores >29.

Table 6: Clinical outcome

Risk factors	Cases	Died	Survived	P value	
Age group	<50	37	02	0.037	
In Years	>50	28	10		
Sex	Male	40	08	0.084	
	Female	25	04		
Organ failure	Present	22	12	10	0.043
Malignancy	Present	04	02	02	0.124
Duration of symptoms	<24 hrs	12	00	12	-
	>24 hrs	53	12	41	
Origin	Non-colonic	61	10	51	0.073
	Colonic	04	02	02	
Type of peritonitis	Generalized	50	12	32	-
	Localized	15	00	15	
Peritoneal fluid	Clear	07	00	07	-
	Purulent	54	10	44	
	Fecal	04	02	02	
MPI score	<21	29	00	29	-
	21 to 29	12	00	12	
	>29	24	12	12	

DISCUSSION

A frequent surgical emergency is peritonitis. According to studies, these patients have a high death and morbidity rate of up to 60%. 18.46% was the mortality rate in the current study, which was comparable to earlier studies. [15] The result in these patients relies on a number of variables, including age, symptom duration, co-morbidities, and more. [16,17]. This has been the subject of numerous research, the majority of which indicated that organ failure, prolonged symptom duration, and increasing age were important risk factors to predict mortality. Only age 50 years and organ failure were identified by the authors of the current study as major risk factors. In contrast to earlier research, other characteristics like co-morbidities, symptom duration, malignancies, origin, type of peritonitis, and peritoneal fluid score were not discovered to be independent risk factors in predicting mortality in peritonitis. [16,18]

As suggested by earlier research, the majority of patients in the current study were men as opposed to women, with a M:F ratio of 1.6:1.[17] As in earlier research, the aetiology of perforation in the current study was frequently owing to duodenal perforation. [19] Comparable to earlier research, the mean MPI scores in non-survivors in the current study.[20]

According to studies, death rates varied between 0% and 100% for patients who received less than 21, 0% and 100% for patients who received between 21 and 29, and between 15% and 100% for those who received more than 29. [21,22] Additional research has revealed a statistically significant link between morbidity and death and rising MPI scores. Patients with an MPI score of 26 or less had a 3.8% mortality rate, whereas those with a score of 26 or more had a 41% mortality rate, according to Yoshiko and Masayuki. [23] According to Correia et al study, 's age >50 years is a significant risk factor since, out of a total of 79.3%, death was found in 85.2% of cases and survival was seen in 67.6%. [24] Female sex was not a poor prognosticator in their study (P = 0.100), with about 24.1% of the males and 19% of the females requiring relaparotomy dying.[25]

CONCLUSION

A scoring system to estimate the risk of morbidity and mortality following emergency surgery has been tried on numerous occasions. Some scoring systems offer a prognosis that comes close to the reported mortality rate for the cohort, but none are reliable enough to rely on when taking into account a specific patient. We can gauge the likelihood that patients will survive by assessing the severity of the illness early on utilising MPI. Death rate in the current study was zero for MPI scores under 21, zero for MPI scores between 21 and 29, and fifty percent for MPI scores over 29, which is helpful in pre-operative prognostication of patients based on MPI values. When forecasting the course of peritonitis, MPI is an easy-to-use and reliable approach.

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