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Original article

Accuracy of Mannheims Peritonitis Index (MPI) in predicting the outcome in patients with perforation peritonitis

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ABSTRACT

BACKGROUND: Perforation peritonitis is a common surgical emergency. Despite advances in diagnosis, management and critical care of patients with peritonitis due to hollow viscus perforation, prognosis remains poor. Pre-operative optimization can reduce intraoperative and post-operative morbidity and mortality, but surgery should not be unnecessarily delayed. Early assessment by scoring systems will influence the management and prognosis.

MATERIAL AND METHODS: This was a prospective study done on75 patients of perforation peritonitis who presented to General Surgery Emergency at Pt. B. D. Sharma PGIMS, Rohtak. Demographic, radiographic, and laboratory data was collected from all these patients as per proforma. Patients with peritonitis secondary to hollow viscous perforation due to trauma and non traumatic perforations in age group of 15-70 years were included in this study. Mannheims peritonitis index (MPI) was calculated in all the patients at the time of admission and correlation of morbidity and mortality was done with MPI.

OBSERVATION AND RESULTS: Commonest age group affected was 41-50 years. Male to female ratio was 3.6:1. The most common site of perforation was gastroduodenal and ileal. Majority 45.3% has faeculent exudates collection as noticed intraoperatively, only 32% had bilious and 21.3% had purulent collection. In the present study 38.7% patients were in low risk group (score <21), 49.3% were in moderate risk (score 21-29) and 12% were in high risk (score >29) group. Most common complication found in this study was respiratory complication and multiple organ failure. Mortality rate was 100% in high risk group (MPI score >29). There was no mortality in low risk group (MPI score <21). In inter mediate group mortality rate was 24%.

CONCLUSION: From our study we concluded that the patients are graded into three groups low risk, moderate risk and high risk. Increasing scores are associated with poorer prognosis, needs intensive management and hence it should be used routinely in clinical practice.MPI is disease specific, easy scoring system for predicting the mortality in patients with secondary peritonitis. Once predicted, proper intensive care should be given to the needy patients to reduce the morbitity and mortality.

KEYWORDS: Peritonitis, Mannheims Peritonitis Index, Perforation peritonits

INTRODUCTION

Acute generalized peritonitis from gastrointestinal hollow viscus perforation is a potentially life threatening condition. Peritonitis due to hollow viscous perforation continues to be one of the most common surgical emergencies. The prognosis of peritonitis remains poor despite development in diagnosis and management because of delayed presentation in Indian setup. [1-4] Peritonitis can be classified as primary, secondary or tertiary, depending upon the source of microbial contamination. In peptic ulcer perforation, the most common site of perforation is first part of the duodenum. The common site of typhoid perforation is the distal ileum, within two feet of the ileocecal junction. Most of the appendicular perforations occur

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at the tip of appendix and the rest at the base of appendix. The most common site of tubercular perforation is the terminal ileum and then the jejunum.[5]

Secondary peritonitis is due to any intra abdominal bowel or other visceral pathology, e.g. perforation, appendicitis. E. coli (70%) is the most common organism involved. Other bacteria noted are aerobic and anaerobic streptococci, Clostridium welchii, Bacteroides, Staphylococci, Klebsiella, Salmonella typhi.[6,7]

Many scoring systems have been designed and used successfully to grade the severity of acute peritonitis like, Acute physiology and chronic health evaluation (APACHE) II score, Simplified acute physiology score (SAPS), Sepsis severity score (SSS), Ranson score, Imrite score, Mannheim peritonitis index (MPI).The Mannheim Peritonitis Index (MPI) is a specific score, which has a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis.[9,10] Taking into consideration the need for a simple accurate scoring system in these conditions the present study was undertaken to evaluate the performance of MPI scoring system to predict the risk of morbidity and mortality in patients with peritonitis due to hollow viscous perforation.

MATERIAL AND METHODS

This study was conducted on 75 patients of perforation peritonitis who presented to General Surgery Emergency at Pt. B. D. Sharma PGIMS, Rohtak for treatment between the time period of April 2021 to may 2022. Demographic, radiographic, and laboratory data was collected from all these patients as per proforma. Patients with peritonitis secondary to hollow viscous perforation due to trauma and non traumatic perforations in age group 15-70 yrs were included in this study. Patients with primary peritonitis (Spontaneous bacterial peritonitis),due to anastomotic dehiscence or leak, immunocompromised patients, age less than 15 and more than 70, conservatively managed patients-pancreatitis, spontaneous bacterial peritonitis and patients on peritoneal dialysis were excluded

The Mannheim Peritonitis Index (MPI) was calculated which is a specific score, with a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis. It includes various variables which includes age, sex, organ failure, presence of malignancy, preoperative duration of peritonitis > 24 h, origin of sepsis not colonic, diffuse generalized peritonitis and type of exudates.

As per following table

THE MANNHEIM PERITONITIS INDEX
RISK FACTOR SCORES

Age > 50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Preoperative duration of peritonitis > 24 h	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudate	
Clear	0
Cloudy, purulent	6
Fecal	12

MPI Score <21: low risk groups, 21-29: moderate risk groups and score >29:high risk group.

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OBSERVATIONS AND RESULTS

In our study maximum number of patients (22.7%) were in age group of 41-50 yrs. The mean (SD) Age was 44.83 years. The increased prevalence of the perforation in the age group of 41- 60 years in our study can be attributed to the fact that gastro duodenal perforations due to peptic ulcer disease was a major cause of perforation peritonitis in our study and the increased prevalence of the etiological risk factors such as smoking, alcoholism and NSAID abuse in this age group.In our study 78.7% were males and 21.3% were females. Majority 45.3% had faeculent exudates collection as noticed intraoperatively, only 32% had bilious and 21.3% had purulent collection. Twenty eight patients had peptic perforation other sites are ileal, jejuna, colonic and appendicular perforation.

Respiratory complications in form of lower respiratory tract infection, post-operative pneumonia, pleural effusion were most common complications. High risk group (MPI>29) had more complications than intermediate (MPI 21 - 29) and low risk group (MPI <21). Out of 75, patients 16 (21.3 %) patients required ICU stay while 59 (78.7%) patients did not require ICU stay. All the patients whose MPI score was >29 required ICU care. All the patients who developed multiple organ dysfunction syndrome expired in ICU. Thus development of multiple organ dysfunction syndrome post operatively is a predictor of mortality. All these patients had MPI of >29. Mortality rate was 100% in high risk group (MPI score >29). There was no mortality in low risk group (MPI score <21). In inter mediate group mortality rate was 24%.

The Mannheim peritonitis index is a peritonitis specific index which is easily applicable. It is based on clinical parameters that are routinely assessed. It also allows for intra operative evaluation of the patients to provide a better assessment of the final prognosis.In our study 29(38.7%) patients had MPI score of less than 21, 37(49.3%) patients had MPI score between 21 to 29 and 9 (12%) patients had MPI score greater than 29 (Table II) . The MPI Score in the peptic perforation ranged from 10 to 25, in jejunal perforation it ranged from 11 to 32, in ileal perforation MPI ranged from 14 to 38 and in colonic perforation MPI ranged from 27 to 34. The MPI Score increased depending on site of perforation from proximal to distal site with smallest score in peptic perforation and maximum in colonic perforation. Exception to the above finding was the MPI Score in the appendicular perforation which ranged from 11 to 18 (Table III).The mortality was nil for patients whose score was less than 21, 24% in patients with score between 21 to 29 and 100 % for those with score greater than 29.

Of the present prognostic scoring system the Mannheim Peritonitis Index is one of the easiest to apply and the determination of risk is easily available during the initial operation.

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Table I Distribution of the patients in terms of site of perforation (n = 75)

Site of Perforation	No of patients	Percentage	95% CI
Peptic (Most common)	28	37.3%	26.7% - 49.3%
Ileal	28	37.3%	26.7% - 49.3%
Jejunal	10	13.3%	6.9% - 23.6%
Colonic	5	6.7%	2.5% - 15.5%
Appendicular	4	5.3%	1.7% - 13.8%

Table No II Distribution of the patients in terms of MPI Severity (n = 75)

MPI Severity	No of patients	Percentage	95% CI
Mild	29	38.7%	27.9% - 50.6%
Moderate	37	49.3%	37.7% - 61.0%
Severe	9	12.0%	6.0% - 22.0%

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Table No III Association between 'Site of perforation and MPI Score'

MPI Score	Site of Perforation					Kruskal Wallis Test	
	Peptic	Jejunal	Ileal	Colonic	Appendicular	χ2	p value
Mean (SD)	20.07 (3.97)	24.50 (6.72)	23.93 (4.67)	31.60 (2.88)	14.25 (2.87)	29.977	<0.001
Median (IQR)	20 (16-24.25)	26(22-29.5)	23.5 (22-26)	32 (31-34)	14 (13.25-15)		
Min - Max	10 - 25	11-32	14 - 38	27 - 34	11 - 18		

Table No IV Association between 'outcome and MPI Score'

MPI Score	Outcome		Wilcoxon-Mann-Whitney U Test	
	Discharged	Expired	W	p value
Mean (SD)	20.42 (4.39)	29.33 (3.91)	56.000	<0.001
Median (IQR)	20 (16-25)	29 (26.25-32)		
Min - Max	10 - 27	24 - 38		

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DISUCSSION

Peritonitis, inflammation of serosal membrane lining the abdominal cavity and abdominal viscera, is associated with high mortality rate. There is no ideal scoring system for the pre-operative assessment of patients needing emergency surgery. In our study maximum number of patients (22.7%) were in age group of 41-50 yrs. The mean (SD) age was 44.83 years. Various studies in the literature have reported variable mean age of perforation patients. Rodolflo et al reported mean age 34 years,[11] Jhobta et al reported 36.8 years.[12] In our study there were 78.7% males and 21.3% females. In the study done by Yilmazlar et al 63% were males and 37% were females.[14] In Corriea et al study 73% were males and 26% were females.[10] In Sharma et al study 87% were males and 13% were females.[13] Jhobta et al studied the spectrum of perforation peritonitis in India and reported that in his study 422 of the 504 (84%) patients studied were males.[12]

Most common site of perforation in the present study was peptic (gastrodudoneal) in 37.3% of patients, ileal in 37.3% patients, jejunal in 13.3% , colonic in 6.7% and 5.3 % patients had appendicular perforation. Also In other studies like Tripathi et al study, 15% had gastric perforation, 10% had appendicular, 24% had ileal and 50% had perforation at other sites.[15] In Kachroo et al study 18% had gastric, 41% had appendicular, 15% had ileal and 25% had perforation at other sites.[16] Ohmann et al reported duodenal ulcer perforation as the commonest cause of perforation in their study.[18] In Nachiappan et al study, 47% had gastroduodenal, 27% had ileal, 13% appendicular and 5% had colonic perforation.[17]

Ninety six percent patients presented with a diffuse form of peritonitis while the remaining 4 % presented with localized peritonitis, in the present study which is similar to other studies like Jhobta et al study where 83 % had diffuse and 17 % had localized peritonitis.[12] In Ohmann et al study 65.36% patients had diffuse peritonitis while 34.64 % had localized peritonitis.[18] In Nachiappan et al study 78% had diffuse peritonitis and 21% had localized peritonitis.[17]

In our study 29(38.7%) patients had MPI score of less than 21, 37(49.3%) patients had MPI score between 21 to 29, 9 (12%) patients had MPI score greater than 29. Other studies like Baothman et al, 91 (41%) patients had MPI score of less than 21, 80 (36%) patients had MPI score between 21 to 29 and 46 (21%) patients had MPI score of greater than 29.[19]

The mortality in the present study was nil for patients whose score was less than 21, 24% in patients with score between 21-29 and 100 % for those with score greater than 29.Fugger reported that the mortality was nil for patients whose score was less than 21 and 100 percent for those with score greater than 29.[21] Billing and others found that the mortality was hundred percent in patients whose score was more than 29. No deaths were noted in those patients whose score was between 12 and 20.[20]

In our study one patient i.e. 1.3 % had colonic origin of sepsis while in the rest 74 patients the origin of sepsis was non colonic, as compared to other studies like Rudolfo et al where 12.64% of patient's had colonic origin of sepsis,[11] Jobhta et al had 3.76% of patients with colonic origin of sepsis. In our study of 75 patients, 18 patients died thus placing the mortality at 24%.[12] Out of 75 patients 28 patients were of age more than 50 years. Out of 18 patients who died 14 patients were above 50 years with a mortality rate of 77% in this group. Patients over 50 years undergoing emergency surgery for laparotomy had a higher risk of mortality. Mortality after surgery undoubtedly increases with age this could be because of increased prevalence of comorbid medical conditions in the elderly.

CONCLUSION

The MPI takes into account age, gender, organ failure, malignancy, duration of peritonitis, involvement of colon and extent of spread and character of the peritoneal fluid. The patients are graded into three groups low risk, moderate risk and high risk. Increasing scores are associated with poorer prognosis, needs intensive management and hence it should be used routinely in clinical practice.MPI is disease specific, easy scoring system for predicting the mortality in patients with secondary peritonitis. Once predicted, proper intensive care can be given to the needy patients so that morbidity and mortality can be reduced.

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