EFFECTIVENESS OF MANNHEIM PERITONITIS INDEX SCORING SYSTEM IN PREDICTING THE MORBIDITY AND MORTALITY IN PERITONITIS DUE TO HOLLOW VISCUS PERFORATION

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ABSTRACT

BACKGROUND

Peritonitis due to hollow viscus perforation is one of the common causes for emergency ward admission under surgery department. Its causes vary from the ones requiring immediate surgical intervention to those requiring conservative management. Its accurate diagnosis and management are a challenge to every surgeon. Scoring systems that provide objective descriptions of the patient's conditions at specific points in the disease process aid our understanding of these problems. Hence this study is undertaken to study the effectiveness of Mannheim's Peritonitis Index (MPI) in predicting the outcome in peritonitis patients who presented to Basaveshwara Teaching and General Hospital, Kalaburagi.

MATERIALS AND METHODS

This study is a clinical, prospective, observational and open study conducted at the department of General Surgery, Basaveshwar Teaching and General Hospital, Kalaburagi from July 2014 to March 2016. The sample size estimation was also done at convenience.

RESULTS

The mean age of the patients was 45.72 (SD 14.26) years. There was male preponderance (66%) with male to female ratio of 1.9:1. In our study, the most common aetiology of peritonitis was duodenal perforation seen in 70% of patients, followed by gastric perforation (13%), ileal (12%), jejunal (3%) and appendicular perforation (2%).

CONCLUSION

Various factors like age, sex, duration, site of perforation, extent of peritonitis and delay in surgical intervention are associated with morbidity and mortality. MPI scoring system is the easiest score to apply. It helps in the determination of the risk during operation and also helps the surgeon know about the possible outcome and the appropriate management. MPI is more effective in predicting the mortality in peritonitis due to hollow viscus perforation.

KEY WORDS

Mannheim's Peritonitis Index, Peritonitis, Perforation.

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BACKGROUND

Peritonitis secondary to hollow viscus perforation is a potentially dangerous condition. Inspite of the advances in investigations and treatment the prognosis remains poor. Early diagnosis and surgery can improve the outcome.[1, 2, 3]

Many scoring systems have been developed 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, Imrie score, Mannheim peritonitis index (MPI).[4, 5]

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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.[6]

Mannheim Peritonitis Index.[7,8]

Risk Factor	Weightage, if any
Age > 50 years	5
Female Gender	5
Organ Failure*	7
Malignancy	4
Preoperative duration of peritonitis >24 hours	4
Origin of sepsis not colonic	4
Diffuse generalised peritonitis	6
Exudates	
Clear	0
Cloudy, Purulent	6
Faecal	12

*Definitions of organ failure: Kidney: creatinine >177 μmol/L, urea >167 μmol/L, oliguria <20 ml/h; Lung: pO2 <50 mmHg, pCO2 >50 mmHg; Shock: hypodynamic or

hyperdynamic; Intestinal obstruction (only if profound): Paralysis >24 h or complete mechanical ileus.

Aims and Objectives

1. To study the validity of scoring system, presently being studied worldwide.
   These are-
   a. Mannheim Peritonitis Index.
   b. Sepsis score of Elebute and Stoner.
   c. APACHE-II.
2. To study the prognostic factors which determine the outcome of the disease.
   These are-
   1. **Patient Factors:**
      a. Age of the patient.
      b. Sex of the patient.
      c. General health of the patient (i.e. nutrition, anaemia).
   2. **Disease Process:**
      a. Site of perforation.
      b. Duration of perforation.
      c. Extent of peritoneal contamination.
   3. **Effect of General Systemic Complications like:**
      a. Respiratory.
      b. CVS system.
      c. Shock.
      d. Multi-organ failure.

Our aim was to study the effect of above factors on Mortality and Morbidity of the patients.

MATERIALS AND METHODS

Our study is a clinical, prospective, observational and open study conducted in 100 patients with peritonitis due to hollow viscus perforation who presented to Surgical Emergency, at Basaveshwar Teaching and General Hospital, Kalaburagi, from July 2016 to March 2018. The sample size estimation was also done at conveniences.

Inclusion Criteria

Patients with clinical suspicion and investigatory support for the diagnosis of peritonitis, due to hollow viscus perforation, who are later confirmed by intra-op findings.

Various Aetiologies causing such Features Include

1. Acid peptic disease.
2. Typhoid.
3. Tuberculosis.
4. Gangrenous bowel.
5. Appendicitis.
6. Malignancy.

Exclusion Criteria

Patients with

1. Associated injuries to other organs.
2. Associated vascular, neurogenic injuries.

Mode of Study

The detailed history and proper clinical findings were entered in a proforma case sheet. Patients were subjected to a methodical physical examination to assess the general condition. Per abdomen examination was done and relevant findings were recorded. Rectal examination was done in all cases, per vaginal examination was also done in female patients.

The required and routine investigations were done to establish the diagnosis. Patients were asked to follow up after a specific interval or at recurrence of symptoms. MPI scoring system was done in all patients and patients were classified as those with a score less than 21, 21-27 and more than 27.

Preoperatively all patients received supportive treatment for correction of hypotension and electrolyte abnormalities. During laparotomy, intra-abdominal examination of all organs was made in addition to specific pathology. Primary closure of hollow viscus perforation was made in all cases with thorough peritoneal lavage and abdominal drains were kept in all patients. Patients were monitored in the post-operative period input-output charts and vital charts were maintained. Drains were removed after 48 hours and sutures were removed on the 7th post-operative day. Most of the operated patients had uneventful recovery, 18 patients had morbidity in terms of wound infection and intensive care, 28 patients died.

The patients were followed up for a variable period of time.

Method of Collection of Data

The study is done after obtaining a detailed history, complete general physical examination and Systemic examination. The patients are subjected to relevant investigations like x-ray erect abdomen, CXR, USG and routine investigations like Hb, TC, urea, creatinine, serum electrolytes.

All investigations and surgical procedures were carried out with proper informed written consent as appropriately. The data regarding patient particulars, diagnosis, investigations and surgical procedures is collected in a specially designed case recording form and transferred to a master chart subjected to statistical methods like mean, standard deviation, proportion, percentage calculation and wherever necessary chi square test for proportion are used.

RESULTS

In this study, 100 cases of secondary and tertiary peritonitis who attended surgical emergency unit during the period of July 2014 to March 2016.

Age (in Years)	Male (%)	Female (%)	Total (%)
Less than 15	0 (0)	1 (100)	1 (1)
16-30	11 (68.8)	5 (31.3)	16 (16)
31-45	24 (68.6)	11 (31.4)	35 (35)
46-60	25 (65.8)	13 (34.2)	38 (38)
Above 60	6 (60)	4 (40)	10 (10)
Total	**66 (66)**	**34 (34)**	**100**

Table 1. Age and Sex Wise Distribution of Study Subjects

In the study, 100 patients with diagnosis of secondary peritonitis were included. The mean age of patients was 45.72(SD 14.26) years ranging from 13 to 75 and majority of patients (68.6%) belonged to age group of 31-45 years. There was male preponderance (66%) with male to female ratio of 1.9:1.

Duration	Mortality (%)	Survival (%)	Total (%)
1 day	1 (7.1)	13 (92.9)	14 (14)
2-5 days	21 (26.9)	57 (73.1)	78 (78)
More than 5 days	6 (75)	2 (25)	8 (8)
Total	**28**	**72**	**100**

Table 2. Time of Presentation of Study Subjects

Chi square value – 11.83, p value – 0.003

In the study group of 100 patients, majority of the patients (86%) presented to the hospital after 24 hours of the onset of symptoms and the mortality of those patient who presented within 2-5 days and after 5 days was 26.9% and 75% respectively as compared to mortality (7.1%) in patients who presented on the first day of onset of symptoms. The chi square value of these patients is 11.83 with a significant p-value of 0.003.

MPI Score	Dead (%)	WI (%)	Survivors (%)	Total (%)
<21	0 (0)	3 (5.8)	49 (94.2)	52 (52)
21-27	12 (41.4)	12 (41.4)	5 (17.2)	29 (29)
>27	16 (84.2)	3 (15.8)	0 (0)	19 (19)
Total	**28 (28)**	**18 (18)**	**54 (54)**	**100**

Table 3. Distribution of Study Subjects and MPI Score

Chi square value – 84.13, p-value – 0.000.

In the study group of 100 patients, 52% of the patients had an MPI score of less than 21, of which 5.8% developed wound infection (WI) with 0% mortality and 94.2% of the patients being normal. 29% patients had an MPI score between 21-27, out of which 41.4% had morbidity (Wound infection) and the mortality rate was 41.4%. in the patients with MPI score >27, the morbidity rate was 15.8% and the mortality rate was 84.2%. The Chi square value is 84.13 with significant p-value of 0.000.

MPI score	WI	NORMAL	TOTAL
≥21	15 (75)	5 (25)	20 (27.8)
<21	3 (5.7)	49 (94.3)	52 (72.2)
Total	**18 (25)**	**54 (75)**	**72 (100)**

Table 4. Morbidity and MPI Score

PPV- 75%, sensitivity- 83.33%, specificity- 90.74%.

In the study group, 75% of the patients had wound infection (Morbidity) with MPI score more than 21 as compared to 5.7% of the patients with MPI score less than 21. The positive predictive value of MPI score for morbidity is 75% with sensitivity – 83.33% and specificity – 90.74%.

MPI Score	Mortality	Normal	Total
≥21	28 (84.8)	5 (15.2)	33 (40.3)
<21	0 (0)	49 (100)	49 (59.7)
Total	**28 (34.1)**	**54 (65.9)**	**82 (100)**

Table 5. Mortality and MPI Score

PPV – 84.8%, sensitivity – 100%, specificity – 90.74%.

In the study group, 84.8% of the patients had mortality among patients with MPI score more than or equal to 21 and none of the patients died with MPI score less than 21. The positive predictive value for mortality is 84.8% with sensitivity 100% and specificity 90.74%.

Aetiology	MPI <21 (%)	MPI ≥21 (%)	Total %
Appendicular	1 (50)	1 (50)	2 (2)
Duodenal	41 (58.6)	29 (41.4)	70 (70)
Gastric	7 (53.8)	6 (46.2)	13 (13)
Ileal	1 (8.3)	11 (91.7)	12 (12)
Jejunal	2 (66.7)	1 (33.3)	3 (3)
Total	**52 (52)**	**48 (48)**	**100 (100)**

Table 6. Aetiology and MPI Score

Chi square value – 10.65, df – 4, p-value – 0.03.

In the study population of 100 subjects, duodenal perforation was seen in 70% of the patients, followed by gastric perforation (13%), ileal (12%), jejunal (3%) and appendicular perforation (2%) as the aetiologies of peritonitis. Among the patients with ileal perforation (12%), 91.7% of them had an MPI score more than 21. The Chi square value is 10.65 and p-value is 0.03 which is significant.

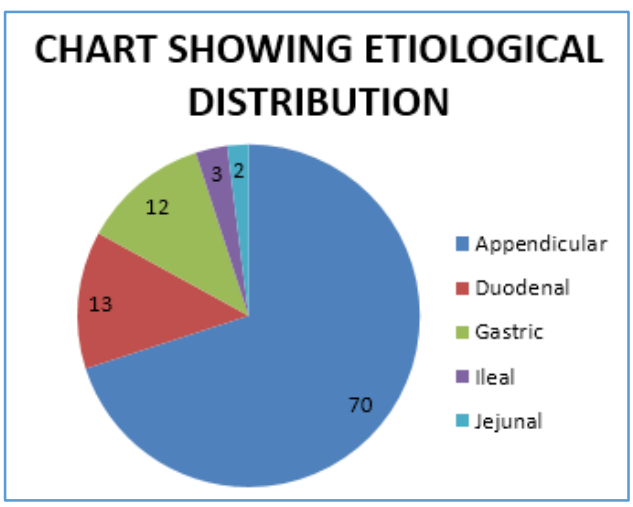

Figure 1

DISCUSSION

Peritonitis following hollow viscus perforation is one of the commonest reasons for emergency surgery. Various factors like age, sex, organ failure, malignancy, extent of peritonitis, type of contamination, site of perforation, surgical interventions, all affect mortality and morbidity. Effective preoperative management, timely surgery and appropriate post-operative care will determine 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.[9,10]

In the present study, 100 cases of peritonitis, those attending BTGH emergency from July 2014 to March 2016 were included with age ranging from 13 to 75 years. The mean age of the patients was 45.72 (SD 14.26) years. There was a male preponderance (66%) with male to female ratio of 1.9:1. In our study, the most common aetiology of peritonitis was duodenal perforation seen in 70% of the patients, followed by gastric perforation (13%), ileal (12%), jejunal (3%) and appendicular perforation (2%).

CONCLUSION

1. Peritonitis remains a hot spot for the surgeons despite advancements in surgical techniques and intensive care treatment. Various factors like age, sex, duration, site of perforation, extent of peritonitis and delay in surgical intervention are associated with morbidity and mortality.
2. Duodenal perforation is the most common aetiology of peritonitis followed by gastric, ileal, jejunal and appendicular perforation.
3. Males are commonly affected compared to females.
4. Emergency laparotomy and primary repair of the hollow viscus perforation is more effective in patients with secondary and tertiary peritonitis.
5. There is no significant difference in prognostic value between the MPI and APACHE II scoring systems.
6. In the management of patients with generalised peritonitis, scoring the patients into various risk groups can be beneficial.
7. MPI scoring system is easiest to apply; the determination of risk is available during operation and surgeon can know about the possible outcome and the appropriate management can be decided.
8. MPI is more effective in predicting the mortality in peritonitis due to hollow viscus perforation.

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