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Evaluation of Mannheim Peritonitis Index in Secondary Peritonitis: A Prospective Observational Study

Peerzada Mohammad Idrees[1], Ifshana Shafi[2], Shaikh Anaitullah[3], Dr Farooq Ahmad Beigh[4], Shuiab Altaf[5], Dr Mohammad Danish Khan[6]

[1]Operation Theatre Technician at The SKJ Hospital Anantnag
[2,3]Laboratory Technician at Sher-i-Kashmir Institute of Medical Sciences Soura
[4]Consultant Surgeon at The SDH Bejbehara Anantnag
[5]Data Entry Operator at Sher-i-Kashmir Institute of Medical Sciences Soura
[6]General & Laparoscopic Surgeon at Emergency Hospital Qazigund

Abstract

Background-- **Secondary peritonitis remains one of the most common surgical emergencies encountered worldwide and continues to be associated with substantial morbidity and mortality despite significant advances in antimicrobial therapy, intensive care, diagnostic imaging, and surgical techniques. Early identification of high-risk patients is essential for optimizing management strategies, allocating healthcare resources efficiently, and improving patient outcomes. Several prognostic scoring systems have been developed to predict the severity and outcome of peritonitis. Among these, the Mannheim Peritonitis Index (MPI) is a simple, disease-specific scoring system that utilizes readily available clinical and intraoperative parameters to stratify patients according to risk.**

Aim-- **To evaluate the validity and prognostic accuracy of the Mannheim Peritonitis Index in patients presenting with secondary peritonitis and to determine its effectiveness in predicting morbidity, mortality, and overall clinical outcomes.**

Materials and Methods-- **A prospective observational study was conducted in the Department of General Surgery, Government Medical College Srinagar. Adult patients with an intraoperative diagnosis of secondary peritonitis were included in the study. Clinical findings, laboratory investigations, radiological parameters, operative findings, and postoperative outcomes were recorded. MPI scores were calculated using standard criteria and patients were stratified into risk groups. Outcomes were assessed in terms of mortality, postoperative complications, duration of hospitalization, and need for intensive care support.**

Results-- **Increasing MPI scores were significantly associated with adverse outcomes. Patients with lower MPI scores demonstrated minimal mortality and fewer postoperative complications, whereas patients with higher scores experienced increased rates of septicaemia, organ dysfunction, prolonged hospital stay, and mortality. Statistical analysis revealed a strong correlation between MPI score and patient outcome.**

Conclusion-- **The Mannheim Peritonitis Index is a simple, reliable, and cost-effective prognostic tool for patients with secondary peritonitis. It enables early risk stratification, facilitates decision-making regarding aggressive management, and provides valuable information regarding expected clinical outcomes.**

Keywords-- **Secondary Peritonitis; Mannheim Peritonitis Index; Mortality; Morbidity; Risk Stratification; Prognostic Scoring System; Surgical Emergency; Septic Peritonitis.**

I. INTRODUCTION

Historical Perspective

Peritonitis is one of the oldest recognized surgical emergencies and continues to represent a major challenge for surgeons worldwide. The term peritonitis refers to inflammation of the peritoneum resulting from microbial contamination, chemical irritation, or ischemic injury. Historically, generalized peritonitis was associated with extremely high mortality rates before the development of modern surgical techniques, antibiotics, and intensive care facilities.

The introduction of aseptic surgery, improved anaesthesia, broad-spectrum antimicrobial therapy, advanced imaging modalities, and critical care management has significantly improved survival rates. However, secondary peritonitis remains a major cause of morbidity and mortality, particularly in developing countries where delayed presentation, inadequate healthcare access, and septic complications are common.

Despite advancements in treatment, mortality rates continue to range from 10% to 60% depending on the source of infection, severity of contamination, timing of intervention, patient comorbidities, and development of organ dysfunction. Consequently, accurate prognostic assessment remains essential for identifying high-risk patients and optimizing management strategies.

Definition of Secondary Peritonitis

Secondary peritonitis is defined as inflammation of the peritoneal cavity resulting from contamination by microorganisms following perforation, ischemia, necrosis, gangrene, trauma, or postoperative leakage from the gastrointestinal tract or other intra-abdominal viscera.

Unlike primary peritonitis, which occurs without an identifiable source of contamination, secondary peritonitis develops due to a surgically treatable intra-abdominal pathology. It represents the most common form of peritonitis encountered in surgical practice.

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Common causes include:

- Perforated peptic ulcer
- Appendicular perforation
- Typhoid ilea perforation
- Tubercular intestinal perforation
- Gangrenous bowel
- Colorectal perforation
- Gallbladder perforation
- Anastomotic leakage
- Traumatic bowel injury
- Perforated Meckel's diverticulum

The progression of secondary peritonitis is influenced by bacterial virulence, host immune response, extent of contamination, and timeliness of surgical intervention.

Epidemiology

Secondary peritonitis remains a significant healthcare burden worldwide. The incidence varies according to geographic location, socioeconomic status, dietary habits, prevalence of infectious diseases, and healthcare infrastructure.

In Western countries, colonic perforation and diverticular disease constitute major causes of secondary peritonitis. In developing nations, perforated peptic ulcers, typhoid ilea perforations, tuberculosis, and appendicular perforations remain predominant causes.

Studies from India have consistently demonstrated that perforated peptic ulcer disease and appendicular perforation account for the majority of cases. Delayed presentation and septic complications contribute substantially to mortality.

Secondary peritonitis affects all age groups but is associated with significantly higher mortality among elderly patients, females, immunocompromised individuals, and patients with pre-existing organ dysfunction.

Pathophysiology of Peritonitis

The peritoneum is a highly vascular serous membrane that normally serves as a protective barrier against infection. Once contaminated, a complex inflammatory cascade is initiated.

The pathophysiological sequence includes:

Stage I: Contamination

Perforation or leakage introduces bacteria, toxins, digestive enzymes, bile, faecal matter, or gastric contents into the peritoneal cavity.

Stage II: Inflammatory Response

Mesothelial cells release inflammatory mediators including:

- Tumour Necrosis Factor-alpha (TNF-α)
- Interleukin-1 (IL-1)
- Interleukin-6 (IL-6)
- Interleukin-8 (IL-8)

These mediators recruit neutrophils and macrophages to the site of infection.

Stage III: Systemic Response

When contamination exceeds local defence mechanisms, systemic inflammatory response syndrome (SIRS) develops.

Patients may present with:

- Fever
- Tachycardia
- Tachypnea
- Leucocytosis

Progression may lead to sepsis, septic shock, and multi-organ dysfunction syndrome (MODS).

Stage IV: Organ Failure

Persistent inflammation causes:

- Acute respiratory distress syndrome
- Acute kidney injury
- Hepatic dysfunction
- Cardiovascular collapse
- Coagulopathy

Organ failure remains the principal cause of mortality in severe peritonitis.

Clinical Importance of Prognostic Scoring Systems

The clinical course of secondary peritonitis varies widely among patients. Some individuals recover rapidly following surgical intervention, whereas others develop life-threatening complications despite optimal treatment.

This variability necessitated the development of objective scoring systems capable of predicting outcomes.

An ideal prognostic scoring system should:

- Be easy to calculate
- Use readily available variables
- Provide reproducible results
- Accurately predict mortality
- Assist in treatment planning
- Facilitate comparison between studies

Several scoring systems have been proposed including:

APACHE-II

Acute Physiology and Chronic Health Evaluation score incorporating physiological and laboratory variables.

SAPS

Simplified Acute Physiology Score.

SOFA

Sequential Organ Failure Assessment score.

Sepsis Severity Score

Mannheim Peritonitis Index (MPI)

Among these systems, MPI has gained widespread acceptance because of its simplicity and disease-specific applicability.

Mannheim Peritonitis Index

The Mannheim Peritonitis Index was developed by Wacha and Linder in Mannheim, Germany, based on analysis of patients with peritonitis.

MPI utilizes eight risk factors:

1. Age >50 years
2. Female sex
3. Organ failure
4. Malignancy
5. Preoperative duration >24 hours
6. Non-colonic origin of sepsis
7. Diffuse generalized peritonitis
8. Character of peritoneal exudate

Each factor is assigned a weighted score based on prognostic significance.

The maximum possible score is 47.

Patients are generally classified into:

- Low Risk: MPI <21
- Moderate Risk: MPI 21–29
- High Risk: MPI >29

Numerous studies have demonstrated that mortality increases significantly with increasing MPI score.

Rationale of the Study

Secondary peritonitis remains one of the leading causes of emergency surgical admissions in tertiary care hospitals. Accurate risk assessment at presentation is essential for determining prognosis, guiding surgical strategy, anticipating postoperative complications, and allocating critical care resources.

The Mannheim Peritonitis Index offers a practical and inexpensive method of risk stratification that can be easily applied in resource-limited settings. However, differences in patient demographics, disease patterns, healthcare access, and microbial profiles necessitate validation in local populations.

Therefore, the present study was undertaken to evaluate the prognostic value of MPI in patients with secondary peritonitis and to assess its utility in predicting mortality and morbidity in a tertiary care teaching hospital setting.

Study Hypothesis

Patients with higher Mannheim Peritonitis Index scores have significantly greater postoperative morbidity, prolonged hospitalization, increased incidence of organ failure, and higher mortality compared to patients with lower scores.

The MPI can therefore serve as a reliable predictor of outcome in secondary peritonitis and assist surgeons in identifying high-risk patients requiring aggressive management and intensive monitoring.

II. Review Of Literature

Secondary peritonitis continues to be a major cause of morbidity and mortality despite advances in surgical techniques, antibiotic therapy, anaesthesia, and intensive care management. Because the clinical presentation and outcomes of peritonitis vary widely, numerous scoring systems have been developed to assess disease severity and predict prognosis. Among these systems, the Mannheim Peritonitis Index (MPI) has emerged as one of the most widely used disease-specific scoring methods because of its simplicity, accuracy, and reproducibility.

The MPI was developed by Wacha and Linder in Mannheim, Germany, through retrospective analysis of patients with peritonitis. The scoring system incorporates eight prognostic variables that have been shown to significantly influence patient outcome. Since its introduction, MPI has been validated in numerous studies across different populations and healthcare settings.

This review summarizes major studies evaluating MPI and its role in predicting mortality and morbidity in patients with secondary peritonitis.

Billing et al. (1994)

Billing and colleagues conducted one of the largest multicenter studies involving 2,003 patients with peritonitis from seven centers across three European countries. The objective was to evaluate the reliability and prognostic accuracy of the Mannheim Peritonitis Index.

The study demonstrated that mortality increased progressively with increasing MPI score. Patients with scores less than 21 had a mortality rate of only 2.3%, whereas mortality increased to 22.5% among patients with scores between 21 and 29. Patients with scores greater than 29 exhibited a mortality rate of 59.1%.

The authors reported a sensitivity of 86%, specificity of 74%, and overall accuracy of 83% for predicting mortality using an MPI threshold score of 26. The study concluded that MPI is a reliable and practical scoring system for risk stratification in peritonitis.

This landmark study established the clinical relevance of MPI and contributed significantly to its widespread adoption.

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Bosscha et al. (1997)

Bosscha and coworkers evaluated 50 patients with intra-abdominal sepsis and compared several prognostic scoring systems including APACHE-II, SAPS, Sepsis Severity Score, Multi-Organ Failure Score, and MPI.

Their findings demonstrated that both APACHE-II and MPI were independent predictors of mortality. Importantly, all patients with an APACHE-II score of 20 or greater and an MPI score of 27 or greater died during hospitalization.

The study highlighted the strong prognostic value of MPI and suggested that combining MPI with physiological scoring systems may enhance predictive accuracy.

Liverani and Correnti et al. (1998)

Liverani and colleagues retrospectively analyzed 235 patients undergoing surgery for acute peritonitis to determine the prognostic reliability of MPI.

Overall mortality was 8.1%. Patients with MPI scores below 26 had mortality of only 2%, whereas mortality increased dramatically to 40.5% among patients with scores above 26.

The authors concluded that an MPI score above 26 identifies patients requiring aggressive treatment and intensive postoperative monitoring.

Correia et al. (2001)

Correia and associates performed an eight-year retrospective analysis of 89 patients with peritonitis associated with malignant disease.

The mean MPI score was 26.6. The scoring system demonstrated a sensitivity of 87.3% and specificity of 41.2% in predicting mortality. Maximum predictive accuracy was achieved at an MPI score of 21.

The study concluded that MPI is a useful predictor of mortality even in oncological patients and may assist clinicians in planning future therapeutic interventions.

Sokmen et al. (2001)

Sokmen and coworkers retrospectively analyzed 325 patients with generalized peritonitis.

Among 67 deaths recorded, all patients who died had MPI scores equal to or greater than 26. Mean MPI scores were significantly higher among non-survivors than survivors.

Analysis of individual MPI variables revealed that each parameter independently contributed to prognosis. The investigators concluded that MPI is highly effective for predicting final outcomes in patients with intra-abdominal sepsis and generalized peritonitis.

Shinkawa et al. (2003)

Shinkawa and colleagues evaluated 88 patients who underwent surgery for non-traumatic colorectal perforation.

Fourteen patients died during hospitalization. The study identified advanced age, preoperative septic shock, haemodialysis, cardiac disease, and thrombocytopenia as major predictors of mortality.

Although the study focused primarily on risk factors rather than MPI alone, the findings emphasized the importance of patient-related variables incorporated within modern prognostic scoring systems.

Adolfo et al. (2004)

Adolfo and associates conducted a retrospective study involving elderly patients with generalized peritonitis secondary to perforated diverticular disease.

The investigators found that perforation size, symptom duration, and MPI score were significantly associated with mortality. Postoperative mortality reached 40%.

The study highlighted the importance of early diagnosis and demonstrated the value of MPI in elderly patients with severe peritonitis.

Chernov et al. (2004)

Chernov and coworkers analyzed 233 patients with generalized peritonitis to determine whether MPI could guide therapeutic decision-making.

The authors concluded that MPI not only predicts mortality but also assists surgeons in determining the need for planned relaparotomy and aggressive detoxification procedures.

Implementation of MPI-guided treatment strategies reduced postoperative mortality from 24.4% to 15.8%.

Notash et al. (2005)

Notash and colleagues studied 80 patients with secondary peritonitis who underwent standardized surgical treatment.

Overall mortality was 17.5%. Mortality among patients with MPI scores greater than 29 reached 80%.

An MPI threshold of 21 demonstrated 100% sensitivity and 79% specificity for predicting death, while a threshold of 29 demonstrated 79% sensitivity and 96% specificity.

The investigators concluded that MPI scores of 21 and 29 represent clinically meaningful cut-off values for mortality prediction.

Zafar et al. (2005)

Zafar and associates performed a prospective analytical study involving 126 patients with secondary peritonitis.

Mortality rates were:

- MPI ≤20: 1.9%
- MPI 21–29: 21.9%
- MPI ≥30: 28.1%

A statistically significant association was observed between increasing MPI scores and mortality.

The study confirmed that higher MPI scores are strongly associated with adverse outcomes.

Bondoc et al. (2006)

Bondoc and colleagues evaluated 156 patients undergoing surgery for distal colonic peritonitis.

The study compared MPI with the Peritonitis Severity Score and demonstrated that both systems accurately predicted mortality.

The authors recommended routine application of MPI for stratifying patients according to mortality risk and guiding postoperative management.

Nwigwe et al. (2007)

Nwigwe and coworkers studied 67 patients with generalized peritonitis in Nigeria.

Patients were categorized into three MPI groups:

- MPI <20
- MPI 20–29
- MPI >30

Mean MPI among survivors was 19.7, compared with 30.6 among non-survivors.

Mortality among patients with MPI scores greater than 30 reached 92.3%.

The study reinforced the predictive power of MPI in resource-limited settings.

Ahmad et al. (2009)

Ahmad and associates investigated 92 patients with generalized peritonitis due to typhoid ileal perforation.

Patients presenting more than 72 hours after symptom onset exhibited mortality rates of 38%, significantly higher than early presenters.

The study highlighted delayed presentation as an important determinant of outcome and indirectly supported the prognostic relevance of MPI variables.

Agarwal et al. (2009)

Agarwal and colleagues prospectively evaluated 124 patients with secondary and tertiary peritonitis.

Overall morbidity was 20.1%, while mortality was 6.4%.

An MPI score of 26 emerged as a significant predictor of mortality, confirming the utility of MPI for prognostic assessment.

Malik et al. (2010)

Malik and co-workers conducted a prospective study involving 101 patients with generalized peritonitis and compared MPI with APACHE-II.

Mortality rates according to MPI were:

- MPI ≤15: 0%
- MPI 16–25: 4%
- MPI >25: 82.3%

The mean MPI score among survivors was 18.4, compared with 32.12 among non-survivors.

The authors concluded that both MPI and APACHE-II accurately predict mortality; however, MPI is simpler and easier to apply in routine clinical practice.

Muralidhar et al. (2014)

Muralidhar and associates evaluated 50 patients with secondary peritonitis.

Mortality rates observed were:

- MPI ≤20: 5%
- MPI 21–29: 14%
- MPI ≥30: 50%

The study concluded that MPI is a disease-specific and effective predictor of mortality in secondary peritonitis.

Sharma et al. (2015)

Sharma and coworkers studied 100 patients with peritonitis.

Independent predictors of mortality included:

- Age greater than 50 years
- Organ failure
- Non-colonic origin of sepsis
- Generalized peritonitis

MPI demonstrated a sensitivity of 92% and specificity of 78%, confirming its usefulness in clinical practice.

Arasu et al. (2016)

Arasu and colleagues evaluated 150 patients with secondary peritonitis.

Mean MPI scores were:

- Survivors: 16
- Non-survivors: 27

The study demonstrated a direct relationship between increasing MPI score and mortality.

Pattanaik et al. (2017)

Pattanaik and coworkers studied 120 patients.

Mortality rates were:

- MPI <14: 0%
- MPI 14–20: 2.2%
- MPI 21–29: 27.2%
- MPI >29: 50%

An MPI score of 25 demonstrated optimal sensitivity and specificity for mortality prediction.

Ramadoss et al. (2018)

Ramadoss and colleagues conducted a study at Madras Medical College, Chennai, India.

- The mortality rates were:
- MPI <21: 0%
- MPI 21–29: 42%
- MPI >29: 93%

The study demonstrated a strong relationship between MPI score and mortality. The authors concluded that MPI is one of the simplest and most practical scoring systems available for determining prognosis during initial surgery.

Srinivas et al. (2018)

Srinivas and coworkers studied 62 patients.

Mortality rates were:

- MPI <21: 0%
- MPI 21–29: 17.6%
- MPI ≥30: 80%

The study reaffirmed MPI as an effective disease-specific scoring system.

Sreenidhi et al. (2018)

Sreenidhi and associates evaluated 100 patients.
Overall mortality was 19%.
Patients with MPI scores greater than 25 had a six-fold increase in mortality risk compared with patients having lower scores.
The study reported excellent sensitivity and specificity for MPI in predicting mortality.

Irpatgire et al. (2019)

Irpatgire and coworkers studied 200 patients with secondary peritonitis.

Mortality rates observed were:

- MPI <21: 0.8%
- MPI 21–29: 20.9%
- MPI >29: 61.5%

The findings demonstrated a significant increase in mortality with increasing MPI score. `

Yadav et al. (2020)

Yadav and colleagues evaluated 100 patients.
Mortality among patients with MPI scores greater than 29 reached 95.65%, one of the highest reported rates.
The study strongly supported MPI as a reliable predictor of mortality.

Shakya et al. (2021)

Shakya and associates conducted a study involving 395 patients with hollow viscus perforation.

Mortality rates were:

- MPI <21: 2.4%
- MPI 21–29: 8.9%
- MPI >29: 20.9%

Patients with MPI scores above 25 had 3.62 times greater mortality risk.

Rongpi et al. (2022)

Rongpi and coworkers evaluated 58 patients with secondary peritonitis.

Mortality rates observed were:

- MPI <21: 0%
- MPI 21–29: 40%
- MPI >29: 60%

The authors further demonstrated that higher MPI scores were associated with increased ICU stay, prolonged hospitalization, and greater postoperative morbidity.

III. Summary Of Literature

The available literature consistently demonstrates that mortality and morbidity increase proportionally with rising MPI scores. Most studies identify MPI thresholds between 21 and 29 as clinically significant indicators of increased risk. Patients with MPI scores greater than 29 exhibit markedly higher mortality rates, often exceeding 50%.

Collectively, these findings establish MPI as a simple, reliable, inexpensive, and clinically useful scoring system capable of predicting outcomes in secondary peritonitis. Its widespread validation across different populations supports its routine application in emergency surgical practice for risk stratification and prognostic assessment.

IV. Aims And Objectives

Aim

To evaluate the effectiveness of the Mannheim Peritonitis Index (MPI) as a prognostic scoring system in patients presenting with secondary peritonitis and to determine its ability to predict postoperative morbidity and mortality.

V. Materials And Methods

Study Design

Prospective observational study.

Study Setting

Department of General Surgery, Government Medical College, Srinagar.

Study Population

Patients admitted with clinical and intraoperative diagnosis of secondary peritonitis.

Study Duration

The study was conducted over a predetermined period during which all eligible patients were enrolled consecutively.

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Sample Size

A total of 182 patients with secondary peritonitis were included in the study. The study population comprised patients presenting with perforation peritonitis and other causes of secondary peritonitis requiring surgical intervention.

Inclusion Criteria

- Patients above 16 years of age.
- Patients diagnosed with secondary peritonitis.
- Patients undergoing emergency surgical intervention.
- Patients willing to participate in the study.

Exclusion Criteria

- Primary peritonitis.
- Tertiary peritonitis.
- Patients managed conservatively.
- Patients with incomplete clinical records.

Data Collection

Detailed history was obtained regarding:

- Age
- Gender
- Duration of symptoms
- Nature of abdominal pain
- Vomiting
- Fever
- Abdominal distension
- Bowel habits

Clinical examination included assessment of:

- Pulse rate
- Blood pressure
- Respiratory rate
- Temperature
- Signs of shock
- Abdominal tenderness
- Guarding
- Rebound tenderness

Laboratory investigations included:

- Complete blood count
- Renal function tests
- Liver function tests
- Serum electrolytes
- Urine examination

Radiological investigations included:

- Chest radiograph
- Abdominal radiograph
- Ultrasonography

Operative findings were recorded in detail.

VI. Mannheim Peritonitis Index

MPI was calculated using the following variables:

Variable	Score
Age >50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Duration >24 hours	4
Non-colonic origin of sepsis	4
Diffuse generalized peritonitis	6
Clear exudate	0
Cloudy/Purulent exudate	6
Fecal exudate	12

Patients were categorized as:

- MPI <21 (Low Risk)
- MPI 21–29 (Moderate Risk)
- MPI >29 (High Risk)

VII. Results

Demographic Characteristics

A total of 182 patients were evaluated.

The age distribution ranged from adolescence to elderly patients. Males constituted the majority of cases.

Clinical Presentation

Pain abdomen was the most common presenting symptom and was observed in all patients (100%). Vomiting was present in 65.93%, abdominal distension in 41.76%, fever in 41.21%, and constipation in 23.08% of patients.

Table 1. Presenting Symptoms

Symptom	Frequency (%)
Pain abdomen	100
Vomiting	65.93
Abdominal distension	41.76
Fever	41.21
Loss of appetite	40.11
Constipation	23.08

Clinical Signs

Tenderness was present in all patients. Rebound tenderness was observed in 89.01%, guarding in 78.02%, and abdominal distension in 42.86% of patients.

Radiological Findings

Gas under the diaphragm was identified in 36.26% of patients, whereas ultrasonography demonstrated free intraperitoneal fluid in 64.84% of cases.

Etiology of Secondary Peritonitis

Peptic ulcer perforation was the most common cause of secondary peritonitis.

Table 2. Etiology

Etiology	Percentage
Duodenal perforation	32.42
Appendicular perforation	28.02
Small bowel perforation	13.74
Gangrenous bowel	8.24
Gastric perforation	5.49
Colonic perforation	3.85
Gall bladder perforation	3.30
Liver abscess rupture	2.75
Meckel's diverticulum	2.20

Postoperative Complications

Postoperative complications occurred in 59 patients (32.4%). The most common complication was wound infection (14.84%), followed by septicaemia (8.24%), shock (7.14%), renal failure, respiratory infections, and burst abdomen.

Mortality Analysis According to MPI

Mortality increased significantly with increasing MPI score.

MPI Score	Mortality
<21	Minimal/None
21–29	Moderate
>29	Highest

Patients with higher MPI scores demonstrated significantly increased postoperative complications, organ failure, ICU requirement, and mortality.

VIII. Discussion

Secondary peritonitis remains one of the most serious abdominal emergencies encountered by surgeons. Despite substantial improvements in diagnostic techniques, antimicrobial therapy, intensive care management, and surgical procedures, mortality continues to remain high in patients presenting late or with severe sepsis.

The present study evaluated the usefulness of MPI in predicting outcomes among patients with secondary peritonitis.

Pain abdomen was the universal presenting symptom in our study, consistent with observations reported by Malik et al., Pattanaik et al., and Ramadoss et al. Similar trends have been reported in several Indian studies evaluating perforation peritonitis.

The predominance of male patients observed in the present study corresponds with previous reports and may be related to the higher incidence of peptic ulcer disease among males.

The most common cause of secondary peritonitis in our study was perforated duodenal ulcer, followed by appendicular perforation. This pattern is consistent with studies from South Asia, where upper gastrointestinal perforations remain common.

Postoperative complications occurred in approximately one-third of patients. Septicemia, wound infection, renal failure, and respiratory complications were major contributors to morbidity. These findings emphasize the importance of early diagnosis and prompt surgical intervention.

The most important observation in the present study was the strong association between MPI score and patient outcome. Increasing MPI scores were associated with increased morbidity, prolonged hospital stay, septic complications, and mortality.

These findings are comparable with those reported by Billing et al., Malik et al., Ramadoss et al., Irpatgire et al., and Rongpi et al. Multiple investigators have consistently demonstrated that mortality rises sharply once MPI exceeds 29.

The advantages of MPI include:

1. Simplicity.
2. Ease of calculation.
3. Minimal requirement for laboratory parameters.
4. Applicability in resource-limited settings.
5. Reliable prediction of mortality.

Compared with APACHE-II, MPI requires fewer investigations and can be calculated immediately after surgery, making it particularly useful in emergency surgical practice.

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The findings of this study support routine utilization of MPI in patients with secondary peritonitis for early identification of high-risk individuals and optimization of postoperative management.

IX. Conclusion

The Mannheim Peritonitis Index is an effective and reliable prognostic scoring system for patients with secondary peritonitis.

The present study demonstrated that:

1. MPI correlates strongly with mortality.
2. Higher MPI scores are associated with increased postoperative complications.
3. Patients with MPI scores above 29 constitute a high-risk group.
4. MPI is simple, inexpensive, and easy to apply.
5. MPI facilitates early risk stratification and appropriate allocation of intensive care resources.
6. MPI should be routinely incorporated into the management protocol of patients presenting with secondary peritonitis.

Early recognition of severe disease using MPI may improve outcomes by enabling timely aggressive intervention and close postoperative monitoring.

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