Original Research

COMPARATIVE EFFICACY OF THE MANNHEIM PERITONITIS INDEX AND JABALPUR PERITONITIS INDEX IN PREDICTING MORTALITY IN PERFORATIVE PERITONITIS: A CROSS-SECTIONAL OBSERVATIONAL STUDY

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ABSTRACT

Background: Perforative peritonitis is a life-threatening surgical emergency associated with high morbidity and mortality, particularly in resource-limited settings. Early risk stratification using prognostic scoring systems is essential for guiding clinical decision-making and optimizing outcomes. The Mannheim Peritonitis Index (MPI) and Jabalpur Peritonitis Index (JPI) are practical bedside tools developed for this purpose. This study aims to evaluate and compare their efficacy in predicting mortality in patients with perforative peritonitis.

Methods: A hospital-based cross-sectional observational study was conducted in the Department of General Surgery at S. Nijalingappa Medical College and HSK Hospital, Bagalkot, over an 18-month period (2024–2026). Forty adult patients diagnosed with perforative peritonitis and undergoing exploratory laparotomy were enrolled. MPI and JPI scores were calculated for each patient. Statistical analysis included ROC curve analysis, chi-square tests, Student's t-test, Mann-Whitney U test, and multivariable linear regression.

Results: The cohort comprised 40 patients (75% male), median age 52.5 years. Both MPI and JPI showed significant correlation with severity parameters. MPI demonstrated greater responsiveness to clinically relevant gradients including sex, operative delay, and age. The median MPI was 25 (IQR: 20–26) and mean JPI was 6.12 ± 2.70. MPI risk classification showed 30% low, 55% moderate, and 15% high risk. Agreement between MPI and JPI risk classes was only fair (weighted kappa = 0.281), suggesting complementary rather than interchangeable utility.

Conclusion: MPI demonstrated superior clinical responsiveness across severity gradients in perforative peritonitis. JPI retained utility as a simplified bedside tool, particularly in resource-limited settings. Combined use of both indices may enhance preoperative risk stratification, guide management decisions, and improve patient outcomes.

Keywords: Perforative Peritonitis, Mannheim Peritonitis Index, Jabalpur Peritonitis Index, Mortality Prediction, Risk Stratification, Emergency Laparotomy, Intra-Abdominal Sepsis.

INTRODUCTION

Perforative peritonitis represents one of the most time-critical emergencies in general surgery, arising at the intersection of hollow viscus catastrophe and uncontrolled host inflammatory response. Exposure of the peritoneal cavity to luminal contents including polymicrobial inocula, bile, fecal particulate matter, and necrotic tissue triggers a cascade of sepsis and septic shock within hours.

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The Sepsis-3 consensus definitions characterize sepsis as life-threatening organ dysfunction caused by a dysregulated host response to infection, and septic shock as profound circulatory and metabolic collapse associated with substantially increased mortality [1]. Perforative peritonitis is therefore not merely a localized intra-abdominal infection; it is a canonical model of infection-related organ dysfunction requiring immediate resuscitation, antimicrobial therapy, and urgent surgical source control.

Sepsis arising from gastrointestinal perforation remains a leading cause of preventable mortality globally. Global Burden of Disease estimates suggest tens of millions of sepsis episodes annually, with significant geographic inequalities in incidence and outcomes [2]. Complicated intra-abdominal

infections (cIAIs), which represent a major subset of abdominal sources of sepsis, are characterized by their capacity to overwhelm peritoneal defenses and amplify the systemic inflammatory response. In perforative peritonitis, mortality is conditioned by the patient's physiological reserve, the pace of presentation, the extent of contamination, and the timeliness of operative intervention and postoperative critical care [3].

The etiological spectrum of perforative peritonitis differs markedly across settings. In high-income countries, perforated peptic ulcer, appendiceal perforation, diverticular disease, and iatrogenic injuries predominate [4]. In low- and middle-income countries (LMICs), the epidemiological mix often includes a greater burden of typhoid ileal perforation, tubercular perforation, and malignant perforations, compounded by delayed access to surgical care [5]. In South Asian settings such as India, delayed presentation often exceeding 24–48 hours from symptom onset is a defining feature that shapes both the intraoperative picture and the prognostic scoring profile of affected patients.

Given the urgency of decision-making in perforative peritonitis, validated prognostic scoring systems are invaluable. They enable early identification of high-risk patients, support allocation of intensive care resources, and provide a standardized communication framework. Among the available indices, the Mannheim Peritonitis Index (MPI) and the Jabalpur Peritonitis Index (JPI) occupy distinct but complementary niches. MPI, developed by Linder and colleagues in Germany, incorporates eight variables including age, sex, organ failure, malignancy, origin of sepsis, extent of peritoneal contamination, duration of peritonitis, and character of intraperitoneal exudate several of which require intraoperative assessment [1, 2]. JPI was designed as a simplified admission-based score for perforated peptic ulcer in resource-constrained settings, relying on age, hemodynamic parameters, renal function, and perforation-to-operation interval [3, 22].

Despite extensive validation of MPI in diverse populations, and growing interest in JPI as a rapid triage tool, head-to-head comparisons of these two indices in mixed-etiology perforative peritonitis from Indian tertiary centers remain limited. Understanding their relative strengths and limitations is clinically important, particularly in settings where both timeliness of scoring and resource availability are constrained. The present study was therefore designed to evaluate and compare the prognostic efficacy of MPI and JPI in a prospective cohort of patients undergoing exploratory laparotomy for perforative peritonitis at a tertiary care teaching hospital in Karnataka, India.

Aims and Objectives

The primary aim was to evaluate and compare the prognostic accuracy of MPI and JPI scores in predicting mortality among patients with perforative peritonitis. The specific objectives were: (1) to calculate MPI and JPI scores in all enrolled patients; (2) to compare the prognostic performance of both indices in predicting in-hospital mortality; (3) to assess the association between demographic factors (age, sex) and mortality; and (4) to evaluate the relationship between perforation-to-operation interval and clinical outcomes.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based, prospective, cross-sectional observational study conducted in the Department of General Surgery, S. Nijalingappa Medical College and HSK Hospital and Research Centre, Bagalkot, Karnataka a tertiary care teaching institution affiliated with Rajiv Gandhi University of Health Sciences, Bangalore. The study period spanned 18 months from January 2024 to June 2026.

Study Population and Sample Size

All consecutive adult patients (>18 years) presenting with clinical and radiological features of perforative peritonitis who underwent exploratory laparotomy during the study period were screened for eligibility. Sample size was estimated using MedCalc software based on ROC curve analysis for mortality prediction using MPI and JPI, assuming an anticipated AUC of 0.75 from prior literature [23]. At 95% confidence level ($\alpha = 0.05$, $Z\alpha = 1.960$) and 80% power ($Z\beta = 0.842$), the minimum required sample size was 36, rounded up to 40 to account for potential exclusions.

Inclusion and Exclusion Criteria

Patients were included if they were: (1) aged >18 years; (2) presenting with acute abdominal pain, distension, vomiting, and fever with corroborative radiological findings (free gas on erect X-ray or CT evidence of perforation); (3) undergoing exploratory laparotomy at the study center; and (4) able to provide written informed consent. Patients were excluded if peritonitis was secondary to traumatic gastrointestinal perforation (blunt or penetrating injury) or postoperative anastomotic leak following surgery at an outside institution.

Data Collection and Clinical Assessment

Data were collected prospectively using a structured case record proforma. Detailed clinical history including onset, duration and character of abdominal pain, abdominal distension, vomiting, fever, and altered bowel habits was recorded. General physical examination documented vital signs (blood pressure, pulse rate, respiratory rate, temperature, oxygen saturation, and Glasgow Coma Scale score). Abdominal examination assessed tenderness, guarding, rigidity, rebound tenderness, and distension.

Laboratory investigations included complete blood count, serum electrolytes, liver function tests, serum creatinine, blood urea, coagulation profile (PT/INR), and arterial blood gas (ABG) analysis. Radiological evaluation comprised erect abdominal X-ray to detect pneumoperitoneum and CECT abdomen-pelvis (where clinically feasible) to localize the perforation site, quantify peritoneal contamination, and detect associated pathology. Intraoperative findings perforation site, etiology, presence of malignancy, extent of peritonitis (localized vs. generalized), nature of peritoneal exudate (clear, purulent, or feculent), and operative procedure performed were systematically documented.

Scoring Systems

MPI was calculated using the eight original variables with standardized weightings: age >50 years (5 points), female sex (5 points), organ dysfunction (7 points), malignancy (4 points), duration of peritonitis >24 hours (4 points), non-colonic origin of sepsis (4 points), generalized peritonitis (6 points), and character of peritoneal exudate (clear = 0, purulent = 6, fecal = 12 points). Patients were classified as low risk (MPI <21), moderate risk (MPI 21–29), or high risk (MPI >29). Organ dysfunction was defined by at least one of: serum creatinine >177 μmol/L, PaO_2 <50 mmHg, or $PaCO_2$ >50 mmHg.

JPI was calculated from five admission parameters perforation-to-operation interval, mean systolic blood pressure, heart rate, serum creatinine, and age each scored 0–6 according to the original scale. Total JPI scores were categorized as low (0–4), moderate (5–15), or high (>15) risk.

Outcome Assessment

Patients were followed until discharge or in-hospital death. The primary outcome was in-hospital mortality, defined as death from any cause during the same hospital admission. Secondary outcomes included duration of hospital stay, need for intensive care, and postoperative complications.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics v19.0. Continuous variables were summarized as mean ± SD (normally distributed) or median with interquartile range (non-parametric). Categorical variables were expressed as frequencies and percentages. Between-group comparisons used the Student's unpaired t-test, Mann-Whitney U test, or Kruskal-Wallis test as appropriate. Categorical associations were assessed using chi-square or Fisher's exact test. Correlation between continuous MPI and JPI scores was evaluated using Spearman's rank coefficient and Pearson's r. Agreement between ordinal risk classes was assessed using quadratic weighted kappa. Multivariable linear regression models assessed independent predictors of hospital stay. The diagnostic performance of MPI and JPI for mortality prediction was evaluated using ROC curves; AUC, sensitivity, specificity, PPV, and NPV were calculated. $P < 0.05$ was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of S. Nijalingappa Medical College and HSK Hospital (IEC approval obtained prior to data collection). All procedures were conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants before enrolment. Patient confidentiality was maintained throughout.

RESULTS

Baseline Demographic and Clinical Profile

A total of 40 patients fulfilled the eligibility criteria and were enrolled. The cohort was predominantly male (n=30; 75%), with a median age of 52.5 years (IQR: 31.5–68.25). The median perforation-to-operation interval was 48 hours (IQR: 45–96 hours), indicating that the majority of patients (80%) presented with surgical delay exceeding 24 hours. Distal bowel perforations were most frequent (42.5%), followed by gastroduodenal (35.0%) and appendicular (22.5%) sources.

Nearly all patients (92.5%) had generalized peritonitis at laparotomy. The predominant intraperitoneal exudate was purulent (85.0%), with fecal contamination in 12.5% and clear exudate in only 2.5%. Organ dysfunction at admission was infrequent (2.5%), reflecting that overt end-organ failure had not yet supervened in most patients despite extensive intraabdominal sepsis. The median MPI score was 25 (IQR: 20–26) and mean JPI was 6.12 ± 2.70. Risk stratification by MPI categorized 12 patients (30%) as low risk, 22 (55%) as moderate risk, and 6 (15%) as high risk. By JPI, 14 patients (35%) were low risk and 26 (65%) were moderate risk; no patients reached the high JPI threshold (Table 1, Table 2).

Table 1. Baseline Characteristics of the Study Cohort by Sex (n=40)

Variable	Overall (n=40)	Male (n=30)	Female (n=10)	p-value
Age (years), median [IQR]	52.5 [31.5–68.3]	52.5 [32.0–68.8]	46.0 [25.3–62.8]	0.803
P-O interval (h), median [IQR]	48 [45–96]	48 [33–72]	86 [48–96]	0.102
Mean systolic BP (mmHg)	110 [100–122]	110 [100–128]	110 [100–110]	0.689

Heart rate (/min)	110 [100–118.5]	110 [102–119.5]	105 [98.5–116.5]	0.471
Hemoglobin (g/dL), mean±SD	12.22±2.91	12.88±2.74	10.24±2.58	0.011*
WBC (/mm³), mean±SD	13248±4995	13048±5191	13850±4557	0.666
Creatinine (mg/dL)	0.90 [0.80–1.10]	0.90 [0.80–1.08]	1.00 [0.72–1.18]	0.838
MPI score, median [IQR]	25 [20–26]	25 [20–25]	25.5 [25–30]	0.008*
JPI score, mean±SD	6.12±2.70	6.13±2.50	6.10±3.38	0.974
Hospital stay (days)	9 [8–12.25]	9 [6.25–11]	12 [10–15.5]	0.020*

IQR = interquartile range; P-O = perforation-to-operation; MPI = Mannheim Peritonitis Index; JPI = Jabalpur Peritonitis Index; SD = standard deviation; *p<0.05 statistically significant.

Table 2. Overall Demographic, Clinical, and Intraoperative Profile of the Study Cohort (n=40)

Variable	Value
Age (years), median [IQR]	52.5 [31.5–68.25]
Male sex, n (%)	30 (75.0%)
P-O interval (h), median [IQR]	48 [45–96]
Delay >24 h, n (%)	32 (80.0%)
Generalized peritonitis, n (%)	37 (92.5%)
Exudate – Purulent, n (%)	34 (85.0%)
Exudate – Fecal, n (%)	5 (12.5%)
Exudate – Clear, n (%)	1 (2.5%)
Perforation site – Distal bowel, n (%)	17 (42.5%)
Perforation site – Gastroduodenal, n (%)	14 (35.0%)
Perforation site – Appendicular, n (%)	9 (22.5%)
Organ dysfunction present, n (%)	1 (2.5%)
MPI score, median [IQR]	25 [20–26]
MPI Low risk (<21), n (%)	12 (30.0%)
MPI Moderate risk (21–29), n (%)	22 (55.0%)
MPI High risk (>29), n (%)	6 (15.0%)
JPI score, mean±SD	6.12±2.70
JPI Low risk (0–4), n (%)	14 (35.0%)
JPI Moderate risk (5–15), n (%)	26 (65.0%)
Hospital stay (days), median [IQR]	9 [8–12.25]

MPI = Mannheim Peritonitis Index; JPI = Jabalpur Peritonitis Index; IQR = interquartile range; SD = standard deviation; P-O = perforation-to-operation.

Comparison of MPI and JPI by Sex and Operative Delay

MPI scores were significantly higher in female patients (median 25.5 [IQR: 25–30]) compared to males (median 25 [IQR: 20–25]; U=67.5, p=0.008; rank-biserial r=0.55). In contrast, JPI showed no significant difference by sex (mean 6.13±2.50 vs. 6.10±3.38, p=0.974). Similarly, MPI was significantly elevated in patients with operative delay >24 hours (median 25 [IQR: 23.75–26]) compared to those operated ≤24 hours (median 18.5 [IQR: 15.75–22.25]; U=69.5, p=0.043), while JPI did not differ significantly by delay group (p=0.565). These findings demonstrate that MPI is more sensitive to clinically relevant severity gradients than JPI.

Table 3. Comparison of MPI and JPI by Sex and Delay to Surgery

Comparison	Score	Group 1	Group 2	Statistic	p
Female vs Male	MPI	25.5 [25–30]	25 [20–25]	U=67.5	0.008*
Female vs Male	JPI	6.10±3.38	6.13±2.50	t=0.03	0.974
Delay >24 h vs ≤24 h	MPI	25 [23.75–26]	18.5 [15.75–22.25]	U=69.5	0.043*
Delay >24 h vs ≤24 h	JPI	6.25±2.82	5.62±2.26	t=0.58	0.565

*p<0.05. Values are median [IQR] for MPI (non-parametric) and mean±SD for JPI (parametric). MPI = Mannheim Peritonitis Index; JPI = Jabalpur Peritonitis Index.

MPI and JPI Risk Classification and Agreement

Cross-classification of MPI and JPI risk categories revealed that among the 12 MPI low-risk patients, 6 were JPI low and 6 were JPI moderate. Among 22 MPI moderate-risk patients, 8 were JPI low and 14 were JPI moderate. All 6 MPI high-risk patients were classified as JPI moderate. Pearson correlation between continuous MPI and JPI scores was r=0.385 (p=0.014), while Spearman's rho was 0.300 (p=0.060). Quadratic weighted kappa for agreement between ordinal risk classes was 0.281 (95% CI: 0.048–0.469), indicating only fair agreement. These findings confirm that MPI and JPI are related but not interchangeable instruments (Table 4).

Table 4. Correlation and Agreement between MPI and JPI

Metric	Estimate	p-value	95% CI / Interpretation
Spearman correlation (MPI vs JPI)	ρ = 0.300	0.060	−0.039 to 0.584; Borderline
Pearson correlation (MPI vs JPI)	r = 0.385	0.014*	Significant linear association
Quadratic weighted kappa (risk classes)	κw = 0.281	—	0.048–0.469; Fair agreement

*p<0.05. MPI = Mannheim Peritonitis Index; JPI = Jabalpur Peritonitis Index.

Effect of Age on Severity Scores

Patients older than 50 years (n=26) had significantly higher MPI scores (p=0.002; Cramer V=0.56 for risk classification) and markedly higher JPI scores compared to those ≤50 years (p<0.001; Phi=0.65). Both MPI and JPI risk class distributions shifted substantially in older patients, with 73% of patients >50 years classified as MPI moderate/high risk versus only 43% in the younger group. The perforation-to-operation interval and blood urea were also higher in the older age group, while systolic blood pressure, heart rate, hemoglobin, and creatinine did not differ significantly, suggesting that age-related severity escalation preceded overt physiological collapse.

Table 5. Association of Age Group with MPI/JPI Risk Classification (n=40)

Risk Category	≤50 years (n=14)	>50 years (n=26)	Statistic	p
MPI Low risk	8 (57.1%)	4 (15.4%)	χ^2=12.61	0.002*
MPI Moderate risk	6 (42.9%)	16 (61.5%)		
MPI High risk	0 (0%)	6 (23.1%)		
JPI Low risk	11 (78.6%)	3 (11.5%)	χ^2=16.87	<0.001*
JPI Moderate risk	3 (21.4%)	23 (88.5%)		

*p<0.05. MPI = Mannheim Peritonitis Index; JPI = Jabalpur Peritonitis Index.

Hospital Stay and Multivariable Analysis

Median hospital stay was 9 days (IQR: 8–12.25). On univariable analysis, female patients had significantly longer hospital stay (median 12 days) compared to males (median 9 days; p=0.020, rank-biserial r=0.50). Age group, operative delay, and JPI risk class were not significantly associated with hospital stay duration. In multivariable linear regression models including MPI and JPI separately alongside sex, anatomical site, age, and operative delay, male sex was the only independent predictor of shorter hospital stay in both models (MPI model: β=−6.87, p=0.004; JPI model: β=−4.97, p=0.012). Neither MPI nor JPI independently predicted length of stay after adjustment, suggesting that postoperative hospitalization was driven by care-process variables not captured in the severity scores.

DISCUSSION

The present study examined a prospective cohort of 40 patients with perforative peritonitis from a tertiary care center in Karnataka, India, characterized by male predominance, median age of 52.5 years, substantial operative delay (80% >24 hours), near-universal generalized peritonitis, and predominantly purulent intraperitoneal contamination. This epidemiological profile closely resembles patterns repeatedly described from South Asian and other LMIC settings, where delayed presentation, advanced intra-abdominal sepsis at laparotomy, and a mixed etiological spectrum are cardinal features [4, 5, 9, 10].

The central finding of this study is that MPI demonstrated greater clinical responsiveness across the observed severity gradients compared to JPI. MPI scores rose significantly with female sex, operative delay, and older age all recognized markers of worsened peritonitis severity in the literature [11, 12, 23]. By contrast, JPI scores were primarily driven by age and showed limited discrimination across sex and delay subgroups. This difference likely reflects the fundamental architectural distinction between the two instruments. MPI integrates intraoperative findings including the extent and character of peritoneal contamination which cumulatively reflect the biological toll of delayed, diffuse peritoneal sepsis. JPI, designed as a simplified pre-operative triage tool for perforated peptic ulcer, relies more heavily on admission physiology and may lose

discriminatory sharpness when most of the cohort is already delayed and physiological collapse is not yet extreme.

The only fair agreement observed between MPI and JPI risk classes (weighted kappa = 0.281) confirms that these indices are not interchangeable. Prior head-to-head comparisons support this finding: Pathak et al. demonstrated that MPI achieved fair to moderate discrimination for mortality in mixed perforative peritonitis, whereas JPI showed higher sensitivity but lower specificity [23]. Koranne et al. similarly found limited superiority of JPI over established alternatives in perforated peptic ulcer [22]. Together, these findings suggest that each score captures partially distinct dimensions of disease severity, and their combined use may therefore provide more complete risk profiling than either alone.

Age emerged as the most consistent host-related severity marker in the present dataset. Patients older than 50 years had significantly higher MPI and JPI scores, longer perforation-to-operation intervals, higher blood urea levels, and clear overrepresentation in moderate/high-risk strata. This pattern strongly mirrors prior literature, where advancing age is a reproducible adverse prognostic variable in peritonitis [1, 13, 16, 17]. Neri et al. specifically demonstrated that age ≥80 years remained an independent predictor of mortality even after adjustment for MPI score [13], while Salamone et al. showed that age >80 years substantially modified risk within MPI strata [53]. The biological basis is plausible: older patients exhibit reduced physiological reserve, increased frailty, impaired immune responses, and lower tolerance for sustained septic stress.

The high prevalence of delayed surgical presentation (80% with delay >24 hours) is a defining feature of this cohort and aligns with several South Asian reports linking access barriers to advanced peritoneal contamination and worse outcomes [5,9,10]. It is clinically coherent that MPI—but not JPI—rose significantly in the delayed group, since MPI variables such as generalized peritonitis and exudate characteristics accrue cumulatively with duration of untreated peritoneal sepsis. This finding supports the use of MPI as a sensitive indicator of cumulative intraabdominal disease burden, particularly in settings where delayed presentation is common.

The near-universal generalized peritonitis (92.5%) and high prevalence of purulent/feculent contamination (97.5%) in this cohort, despite relatively uncommon overt organ dysfunction at admission, reflects the South Asian pattern of advanced local sepsis preceding systemic collapse. Linder's original MPI work placed major prognostic weight on diffuse peritonitis and exudate character precisely because these intraoperative variables capture intra-abdominal septic burden more directly than admission laboratory parameters [1]. The large European multicentre validation by Billing et al. confirmed this, with mortality rising from 2.3% (MPI <21) to 59.1% (MPI >29) [43].

Sex-related differences in MPI—but not JPI—may partly reflect the structural incorporation of female sex as a five-point component in the original MPI scoring system [1], rather than representing an entirely independent biological effect. Nevertheless, the observed significantly lower hemoglobin in female patients and their longer hospital stay suggest a genuine difference in case mix or comorbid burden in this cohort. Multiple large studies have not consistently confirmed female sex as an independent predictor of mortality in perforative peritonitis after adjusting for age, comorbidity, shock, and delay [16, 18, 19, 23], indicating that caution is warranted in overinterpreting sex-related MPI differences in small cohorts.

Hospital stay was not independently predicted by either MPI or JPI in multivariable models, which is consistent with the literature. Postoperative hospitalization is influenced by multiple downstream determinants including wound complications, stoma care, nutritional recovery, and non-medical disposition barriers that are not captured by mortality-oriented prognostic indices [27, 30]. The finding that male sex predicted shorter hospital stay may reflect differences in social support structures, care processes, or case-mix factors related to comorbidity rather than any direct severity relationship.

The present study has several limitations. The sample size of 40 patients, while meeting the a priori power calculation, limits the ability to detect small but clinically important differences, particularly for rare outcomes such as death. Mortality data are referenced throughout the qualitative analysis, but the tabulated results emphasize score distributions and subgroup contrasts rather than formal mortality-discrimination statistics, which constrains direct ROC-based comparison in this report. The single-center design in a referral hospital in North Karnataka may limit generalizability to other regional settings or case mixes. The retrospective extraction of some intraoperative variables from records may introduce ascertainment variability. Future multicenter studies with larger sample sizes and formal mortality end-points are needed to confirm the relative performance of MPI and JPI in contemporary Indian practice.

CONCLUSION

Both the Mannheim Peritonitis Index and the Jabalpur Peritonitis Index are clinically applicable prognostic tools for patients with perforative peritonitis. In the present prospective cohort from a tertiary care center in South India, MPI

demonstrated superior responsiveness to clinically relevant severity gradients including operative delay, sex, and advancing age. The fair agreement between MPI and JPI risk classifications suggests that they measure overlapping but distinct dimensions of disease severity. MPI is recommended as the primary stratification tool in mixed-etiology perforative peritonitis due to its comprehensiveness and intraoperative grounding, while JPI retains utility as a rapid, pre-operative, resource-conserving triage instrument. Advancing age emerged as the most consistent independent severity marker across both scoring systems. Future research should focus on multicenter prospective validation with mortality as the primary endpoint, and on evaluating whether combined use of both indices improves prognostic accuracy beyond either index alone.

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