**Original article:
Study of comparison of scoring systems: Mannheim peritonitis index (MPI) and Jabalpur peritonitis index (JBI), in predicting mortality in patients of secondary peritonitis**

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**Abstract:**

**Introduction:** Secondary peritonitis following a perforated hollow viscus remains a potentially fatal condition. Despite advanced techniques in diagnosis, surgical techniques, ant-microbial therapy and intensive care support, secondary peritonitis has a poor prognosis.

**Methodology:** This study was conducted in The Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. Fifty cases of acute bacterial peritonitis secondary to gastro intestinal tract perforations were encountered during the study period of one year from 01.10.2019 to 31.10.2020. Nature of the study was retrospective study and cases were included into the study by application of following criteria.

**Results:** Receiver Operator Characteristic (ROC) curve analysis of MPI Index were AUC (Area Under the ROC curve)=0.973 , p=0.0005<0.01 which shows highly statistical significant difference with sensitivity=88.5%, specificity=91.70% and cut off=27. Similarly in Receiver Operator Characteristic (ROC) curve analysis of Jabalpur Index were AUC (Area Under the ROC curve)=0.902 , p=0.0005<0.01 which shows highly statistical significant difference with sensitivity=80.80%, specificity=83.30% and cut off=10,which shows that MPI Scoring system better than the Jabalpur index Scoring system to predict the mortality.

**Conclusion:** Secondary peritonitis, encountered in emergency surgical wards is commonly due to bowel (hollow viscus) perforation. This condition needs emergency evaluation, resuscitation, proper utilization of severity scoring system, with prognostic tools and timely and effective management, including operative surgery, without which the mortality rate may reach 100 percent

Keywords : Secondary peritonitis , fatal condition , Mannheim peritonitis index, Jabalpur peritonitis index

**Introduction:**

Secondary peritonitis following a perforated hollow viscus remains a potentially fatal condition. Despite advanced techniques in diagnosis, surgical techniques, ant-microbial therapy and intensive care support, secondary peritonitis has a poor prognosis.1 Many severity index scores are in vogue, with each institution following a particular or more than one scoring system. Most commonly used scoring system includes Boey’s Index, Mannheim Peritonitis Index (MPI), Jabalpur Peritonitis Index (JPI), the Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) score, Simplified Acute Physiology Score (SAPS), Multi- organ Dysfunction Score (MODS), Sepsis Related Organ Failure Assessment (SOFA), and Acute Physiology and Chronic Health Evaluation II (APACHE II) scoring systems.2,3,4

**Methodology:**

This study was conducted in The Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. Fifty cases of acute bacterial peritonitis secondary to gastro intestinal tract perforations were encountered during the study period of one year from 01.10.2019 to 31.10.2020. Nature of the study was retrospective study and cases were included into the study by application of following criteria.

# Inclusion Criteria

* + 1. Peritonitis secondary to hollow viscus perforation.
		2. Age group between 12 to 90 yrs.
		3. Both males and females were included in the study.

# Exclusion Criteria

1. Perforation secondary to trauma
2. Perforation in paediatric population (less than 12 years)

All the necessary preoperative data were recorded. Blood sample and relevant basic investigation details were collected. Urethral catheter monitoring data collected from the record sheets. The data for the evaluation of various parameters stipulated by Manheim’s Peritonitis Index (MPI) and Jabalpur Peritonitis Index (JPI) were collected from the case sheets and analyzed systematically.

**Results:**

**Table 1: Comparison between Exudate with Outcome**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Exudate | Outcome | Total | ꭓ 2 - value | p-value |
| Dead | Recovered |
| Clear | Count | 0 | 16 | 16 | 25.733 | 0.0005 \*\* |
| % | 0.0% | 66.7% | 32.0% |
| Cloudy | Count | 7 | 3 | 10 |
| % | 26.9% | 12.5% | 20.0% |
| Facial | Count | 8 | 2 | 10 |
| % | 30.8% | 8.3% | 20.0% |
| Purulent | Count | 11 | 3 | 14 |
| % | 42.3% | 12.5% | 28.0% |
| Total | Count | 26 | 24 | 50 |
| % | 100.0% | 100.0% | 100.0% |
| \*\* Highly Statistical Significance at p < 0.01 level |

**Table 2: Comparison between Co-morbidity with Outcome**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Co-morbidity | Outcome | Total | ꭓ 2 - value | p-value |
| Dead | Recovered |
| Present | Count | 18 | 7 | 25 | 8.013 | 0.005 \*\* |
| % | 69.2% | 29.2% | 50.0% |
| Absent | Count | 8 | 17 | 25 |
| % | 30.8% | 70.8% | 50.0% |
| Total | Count | 26 | 24 | 50 |
| % | 100.0% | 100.0% | 100.0% |
| \*\* Highly Statistical Significance at p < 0.01 level |

**Table 3: Comparison of Heart rate with Outcome by Unpaired t-test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Outcome | N | Mean | SD | t-value | p-value |
| Heart rate | Dead | 26 | 120.9 | 17.1 | 4.792 | 0.0005 \*\* |
| Recovered | 24 | 101.4 | 10.6 |
| \*\* Highly Statistical Significance at p < 0.01 level |

**Table 4: Comparison of Pre op duration with Outcome by Unpaired t-test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Outcome | N | Mean | S.D | t-value | p-value |
| Pre op duration | Dead | 26 | 58.3 | 29.9 | 4.638 | 0.0005 \*\* |
| Recovered | 24 | 22.6 | 23.8 |
| \*\* Highly Statistical Significance at p < 0.01 level |

**Table 5: Comparison of MPI Index with Outcome by Unpaired t-test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Outcome | N | Mean | S.D | t-value | p-value |
| MPI Index | Dead | 26 | 31.3 | 4.7 | 11.276 | 0.0005 \*\* |
| Recovered | 24 | 11.7 | 7.4 |
| \*\* Highly Statistical Significance at p < 0.01 level |

**Table 6: Comparison of Jabalpur Index with Outcome by Unpaired t-test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Outcome | N | Mean | S.D | t-value | p-value |
| Jabalpur Index | Dead | 26 | 13.5 | 6.0 | 5.603 | 0.0005 \*\* |
| Recovered | 24 | 5.6 | 3.5 |
| \*\* Highly Statistical Significance at p < 0.01 level |

**Table 7: Receiver Operator Characteristic (ROC) curve analysis of MPI Index, Jabalpur Index**

|  |
| --- |
| **Area Under the Curve** |
| Test Result Variable(s) | Area | p-value | 95% C.I | Cut off | Sensitivity | Specificity |
| LB | UB |
| MPI Index | .973 | 0.0005 \*\* | .933 | 1.000 | 27 | 88.5% | 91.70% |
| Jabalpur Index | .902 | 0.0005 \*\* | .819 | .986 | 10 | 80.80% | 83.30% |
| \*\* Highly Statistical Significant at p < 0.01 level |



**Figure 1**

The above table shows Receiver Operator Characteristic (ROC) curve analysis of MPI Index were AUC (Area Under the ROC curve)=0.973 , p=0.0005<0.01 which shows highly statistical significant difference with sensitivity=88.5%, specificity=91.70% and cut off=27. Similarly in Receiver Operator Characteristic (ROC) curve analysis of Jabalpur Index were AUC (Area Under the ROC curve)=0.902 , p=0.0005<0.01 which shows highly statistical significant difference with sensitivity=80.80%, specificity=83.30% and cut off=10,which shows that MPI Scoring system better than the Jabalpur index Scoring system to predict the mortality.

**Discussion:**

In our study , age distribution were 8.0% is 18-20 years, 8.0% is 21-30 years, 12.0% is 31-40 years, 20.0% is 41-50 years, 18.0% is 51-60 years, 22.0% is 61-70 years, 10.0% is 71-80 years, 2.0% is Above 80 years. Gender distribution were 24.0% are Female, 76.0% are Male. Outcome distribution were 52.0% is Dead, 48.0% is Recovered. Age with Outcome by Pearson’s chi-squared test were ꭓ2=5.486 , p=0.601>0.05 which shows no statistical significant association between Age and Outcome. Gender with Outcome by Pearson’s chi-squared test were ꭓ2=0.025 , p=1.000>0.05 which shows no statistical significant association between Gender and Outcome.5,6

 Paralytic ileus with Outcome by Pearson’s chi-squared test were ꭓ2=20.852 , p=0.0005<0.01 which shows highly statistical significant association between Paralytic ileus and Outcome. Organ failure with Outcome by Pearson’s chi-squared test were ꭓ2=39.224 , p=0.0005<0.01 which shows highly statistical significant association between Organ failure and Outcome. Malignancy with Outcome by Pearson’s chi-squared test were ꭓ2=1.745 , p=0.351>0.05 which shows no statistical significant association between Malignancy and Outcome. Origin of sepsis with Outcome by Pearson’s chi-squared test were ꭓ2=3.904 , p=0.563>0.05 which shows no statistical significant association between Origin of sepsis and Outcome. Diffuse generalised peritonitis with Outcome by Pearson’s chi-squared test were ꭓ2=25.962 , p=0.0005<0.01 which shows highly statistical significant association between Diffuse generalised peritonitis and Outcome.7,8 , 9

 MPI Index with Outcome by Unpaired t-test were t-value=11.276, p=0.0005<0.01 which shows highly statistical significant difference between MPI Index and Outcome. Jabalpur Index with Outcome by Unpaired t-test were t-value=5.603, p=0.0005<0.01 which shows highly statistical significant difference between Jabalpur Index and Outcome. Receiver Operator Characteristic (ROC) curve analysis of MPI Index were AUC (Area Under the ROC curve)=0.973 , p=0.0005<0.01 which shows highly statistical significant difference with sensitivity=88.5%, specificity=91.70% and cut off=27. Similarly in Receiver Operator Characteristic (ROC) curve analysis of Jabalpur Index were AUC (Area Under the ROC curve)=0.902 , p=0.0005<0.01 which shows highly statistical significant difference with sensitivity=80.80%, specificity=83.30% and cut off=10.

**Conclusion:**

Secondary peritonitis, encountered in emergency surgical wards is commonly due to bowel (hollow viscus) perforation. This condition needs emergency evaluation, resuscitation, proper utilization of severity scoring system, with prognostic tools and timely and effective management, including operative surgery, without which the mortality rate may reach 100 percent

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