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Original Research Article

Comparison of the efficacy of Jabalpur prognostic scoring system with Mannheims peritonitis index in evaluation of prognosis in patients with perforation peritonitis

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ABSTRACT

Background: Peritonitis is defined as inflammation of the serosal membrane that lines the abdominal cavity and the organs contained therein. Peritonitis is often caused by the introduction of infection into the otherwise sterile peritoneal environment through the perforation of the bowel, such as the ruptured appendix or colonic diverticulum. The disease may also be caused by the introduction of a chemically irritating material, such as gastric acid from a perforated ulcer. Peritonitis secondary to perforation of the gastrointestinal tract, a common occurrence in this country, requires emergency surgical intervention and is associated with significant morbidity and mortality rates.
Methods: This was a comparative prospective cohort study in which 150 patients presenting with symptoms peritonitis secondary to hollow viscus perforation in general surgery department, Sri Venktaeshwara Medical College, Tiruapti from March 2017 to November 2018 were taken for the study.
Results: Jabalpur prognostic scoring system has a slightly higher area under the curve of 96% when compared with the Mannheims peritonitis index score with 95%. So this shows that the Jabalpur prognostic scoring system has slightly greater indices than, that of Mannheims peritonitis index scoring system in predicting the prognosis of perforative peritonitis.
Conclusions: In patients with perforation peritonitis, Jabalpur prognostic scoring system is an easy and reliable predictor in evaluating prognosis. In developing countries like India, where in resources are limited, Jabalpur prognostic scoring system will greatly help in predicting prognosis in patients with perforarion peritonitis. Because of its cost effectiveness, availability and ease of use, it is recommended as a part in the holistic approach of treatment of perforation peritonitis.

Keywords: Mannheims peritonitis index scoring system, Jabalpur prognostic scoring system, Perforation peritonitis

INTRODUCTION

Peritonitis is defined as inflammation of the serosal membrane that lines the abdominal cavity and the organs contained therein. Peritonitis is caused due to infection into the sterile peritoneal cavity because of perforation of hollow viscus like appendicular perforation. Peritonitis is also be caused by the introduction of a chemically irritating material, such as gastric acid from a perforated gastric or duodenal ulcer. Peritonitis secondary to

perforation of the gastrointestinal tract requires emergency surgical intervention and is associated with increased morbidity and mortality rates.

The first clinical description of perforated peptic ulcer was made by Crisp in 1843. Smoking and use of non-steroidalanti-inflammatory drugs are important risk factors for perforation.[1] Presence of pneumoperitoneum in X-ray erect abdomen is diagnostic of peritonitis due to hollow viscus perforation. Non-operative management is successful in patients identified to have a spontaneously sealed perforation proved by water-soluble contrast gastroduodenogram.

Surgical management consists of omental patch closure, but this can be done by the laparoscopic method. Laparoscopic approaches to the closure of duodenal perforation are now being applied widely and is beneficial in cases presented within 24 hours of onset of symptom and in those cases where size of perforation is upto 10 mm.[2]

Objectives

- To study the validity of the scoring system.
  - Jabalpur prognostic scoring system.
  - Mannheim peritonitis index.
- To study the prognostic factors which determine the outcome of the disease.

METHODS

This was a comparative prospective cohort study in which 150 patients presenting with symptoms peritonitis secondary to hollow viscus perforation in general surgery department, Sri Venktaeshwara Medical College, Tiruapti from March 2017 to Nov 2018 were taken for the study.

Inclusion criteria

Inclusion criteria were patients diagnosed with peritonitis secondary to hollow viscus perforation and treated surgically; subjects giving written informed consent.

Exclusion criteria

Exclusion criteria were peritonitis secondary to trauma; age less than 18 years; peritonitis patients with laparotomy done elsewhere or transferred out to continue treatment elsewhere; postoperative peritonitis; cases left against medical advise.

Procedure

Patients fulfilling the inclusion and exclusion criteria are selected. Written and informed consent is taken. Data is collected by taking a proper history, clinical examination, investigations, intraoperative findings and postoperative status. Once the diagnosis of peritonitis had been determined, the patient is enrolled into the study. Using history, clinical examination, and lab values risk factors found in MPI are classified according to values indicated and individual variable scores are added to establish MPI score. The cases are first grouped into three: those below 21 points, between 21-29 points, and those above 29 points.

In the same way, Jabalpur Peritonitis Scoring is calculated based on the preoperative parameters of the patient. These patients are divided into four groups based on the range of score obtained: those are 0-4, 5-9, 10-14 and 15-21.

Statistical analysis

The data has been entered into MS-Excel and statistical analysis has been done by using IBM SPSS Version 22.0. To represent a sensitivity/specificity pair corresponding to a particular decision, receiver operating characteristic (ROC) curve was used and to measure how well a parameter can distinguish between two diagnostic scores, the area under the ROC curve (AUC) was used. All the 'P' values having less than 0.05 are considered as statistical significant.

RESULTS

Among the 150 cases in this study, 20 cases expired with a Mortality rate of 13.33%. Among 20 cases expired 13 cases (65%) are males and 7 cases (35%) are female. This is because the number of male cases in this study is 118 which are more when compared to 32 female cases. 7 (21.8%) out of 32 female cases in this study expired when compared to 13 (11.01%) out of 118 male patients indicating mortality is more in female gender when compared to male gender.

Table 1: Comparison of morbidity and mortality in two scoring systems.

S. no	Complications	MPI score			JP score			
		<21	21-29	>29	0-4	5-9	10-14	>15
1	Surgical site infection	10	10	10	9	11	9	1
2	Burst abdomen	1	2	2	0	1	4	0
3	Pulmonary complications	1	2	5	3	4	1	0
4	Postoperative leak	0	0	2	0	1	1	0
5	Deep vein thrombosis	0	1	0	1	0	0	0
6	Mortality	0	5	15	0	2	15	3

Table 2: Mortality and MPI score.

MPI score	Patients			Mortality		
	Male	Female	Total	Male	Female	Total
<21	74	14	88	00	00	00
21-29	35	4	39	05	00	05 (12.8%)
>29	09	14	23	08	07	15 (65.2%)
Total	118	32	150	13	07	20

Table 3: Mortality* MPI score group.

			MPI score group			Total
			<21	**21-29**	**>29**	
Mortality	Yes	Count	0	5	15	20
		% within mortality	0.0	25.0	75.0	100.0
		% within MPI score group	0.0	12.8	65.2	13.3
	No	Count	88	34	8	130
		% within mortality	67.7	26.2	6.2	100.0
		% within MPI score group	100.0	87.2	34.8	86.7
Total		Count	88	39	23	150
		% within mortality	58.7	26.0	15.3	100.0
		% within MPI score group	100.0	100.0	100.0	100.0

Chi-Square value = 67.128, p<0.0001 (very high sig.)

Table 4: Mortality* JPS score group.

			JPS score group				Total
			0-4	**5-9**	**10-14**	**15-21**	
Mortality	Yes	Count	0	2	15	3	20
		% within mortality	0.0	10.0	75.0	15.0	100.0
		% within JPS score group	0.0	4.1	65.2	100.0	13.3
	No	Count	75	47	8	0	130
		% within mortality	57.7	36.2	6.2	0.0	100.0
		% within JPS score group	100.0	95.9	34.8	0.0	86.7
Total		Count	75	49	23	3	150
		% within mortality	50.0%	32.7	15.3	2.0	100.0
		% within JPS score group	100.0%	100.0	100.0	100.0	100.0

Chi-Square value=88.248, p<0.0001 (very high sig.)

Table 5: Area under the curve.

Area under the curve					
Test result variable(s)	**Area**	**Std. error**	**P value**	**Asymptotic 95% confidence interval**	
				Lower bound	Upper bound
MPI score	0.952	0.018	<0.0001 VHS	0.917	0.987
JPS score	0.968	0.018	<0.0001 VHS	0.933	1.000

The test result variable(s): MPI_SCORE, JPS_SCORE has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

In the study group, 65.2% of patients had Mortality among patients with MPI score more than 29 and12.8% of patients had mortality in MPI score 21-29,and none of the patients died with MPI score less than 21, with a p value of <0.0001 which is highly significant.

In this study group, 100% of patients had mortality among patients with Jabalpur prognostic score more than 15, 65.2% of patients with Jabalpur prognostic score of 10-14 has expired, 4.1% of patients had mortality in Jabalpur prognostic score of 5 to 9, and none of the patients died with Jabalpur prognostic score of 0 to 4, with a p value of <0.0001 which is highly significant indicating more the Jabalpur prognostic score more the risk of mortality.

Receiver operator characteristic curves were drawn to calculate the discriminatory ability of the two scores. The

ROC curves are graphs plotted between sensitivity and specificity. The area under curve for each of the scores were calculated for different cut off points and the cut off at which maximum AUC was obtained was chosen. The area under the curve for Manheims peritonitis index is 0.952 with 95% confidence intervals 0.917 and 0.987.The area under the curve for Jabalpur prognostic score being 0.968 with the 95% confidence intervals 0.933 and 1.000 with a high significant p value which indicates Jabalpur prognostic system is as efficient as Mannheim peritonitis index scoring system in predicting mortality in patients with perforation peritonitis secondary to hollow viscus perforation.

Jabalpur prognostic scoring system has a slightly higher area under the curve of 96% when compared with Mannheim peritonitis index score with 95%. So this shows that the Jabalpur prognostic scoring system has slightly higher indices than that of Mannheim peritonitis index scoring system in predicting the number of patients who are going to die of perforation peritonitis.

DISCUSSION

In the study group of 150 patients, 58.7% of patients had MPI score less than 21, out of which no patient expired with 0% mortality, and 12.8% mortality is seen with MPI score between 21 to 29 and those patients with MPI score more than 29 had the highest mortality, i.e. 65.2%.

In a similar study conducted by Billing et al patients with scores of less than 21 had a mortality rate ranging from 0-2.3% and those with MPI between 21 and 29 had a mortality rate of approximately 65%.[3] MPI score of more than 29 had the highest mortality, up to more than 80% in some studies.

Notash et al have shown important cut-off points to be 21 and 29 when using the MPI, with mortality of60%, and up to 100% for scores more than 29.[4]

Yoshiko et al, evaluated the reliability of the MPI in predicting theoutcome of patients with peritonitis in 108 patients.[5] A comparison of MPI and mortality showed patients with an MPI score of 26 or less have a mortality of 3.8%, whereas those with a score exceeding 26 had a mortality of 41.0%.

In a study conducted by Qureshi et al score of <21 had a mortality of 1.9%, a score of 21-29 had 21.9%, and score >30 had a mortality of 28.1%. The mortality rate for MPI scores more than 26 was 28.1% while for scores less than 26 it was 4.3%.[6]

In the present study group, 100% of patients had mortality among patients with Jabalpur prognostic score more than 15, 65.2% of patients with Jabalpur prognostic score of 10-14 expired, 4.1% of patients had mortality in Jabalpur prognostic score of 5 to 9 and none of the patients died with Jabalpur prognostic score of 0 to 4 with a $p<0.0001$ which is highly significant indicating more the Jabalpur prognostic score more the risk of mortality.

In a similar study conducted by Mishra et al, no patient with Jabalpur score of 0 to 4 died whereas all patients who had a score of >15 died.[7]

In a similar study conducted by Subangi et al mortality of 3.2% is seen with Jabalpur prognostic score of 0 to 4,whereas mortality of 44% was seen in patients with Jabalpur prognostic score of 5 to 15 and 100% mortality is seen in patients with Jabalpur prognostic score of >15.[8]

Receiver operator characteristic curves were drawn to calculate the discriminatory ability of the two scores. The ROC curves are graphs plotted between sensitivity and specificity. The area under curve for each of the scores were calculated for different cut off points, and the cut off at which maximum AUC was obtained was chosen. The area under the curve for Manheims peritonitis index is 0.952 with 95% confidence intervals 0.917 and 0.987. The area under the curve for Jabalpur prognostic score being 0.968 with the 95% confidence intervals 0.933 and 1.000 with a high significant 'P' value.

Jabalpur prognostic scoring system has a slightly higher area under the curve of 96% when compared with the Mannheims peritonitis index score with 95%. So this shows that the Jabalpur prognostic scoring system has slightly greater indices than, that of Mannheims peritonitis index scoring system in predicting the prognosis of perforative peritonitis.

CONCLUSION

In patients with perforation peritonitis, Jabalpur prognostic scoring system is an easy and reliable predictor in evaluating prognosis. In developing countries like India, where in resources are limited, Jabalpur prognostic scoring system will greatly help in predicting prognosis in patients with perforarion peritonitis. Because of its cost effectiveness, availability and ease of use, it is recommended as a part in the holistic approach of treatment of perforation peritonitis.

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