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Role of Mannheim Index in predicting mortality in cases of peritonitis

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I. Introduction

Peritonitis is inflammation of the peritoneum and/or peritoneal cavity due to localized or generalized infections. Most cases of peritonitis are consequence to the invasion of the peritoneal cavity by bacteria from the gut. The outcome of an abdominal infection depends on the complexinteraction of many different factors and the success obtained with the early onset of specific therapeutic procedures[1]**.** It may also depend upon exact recognition of the seriousness of the disease, an accurate assessment and classification of the patient's risks. Early prognostic evaluation of abdominal sepsis is desirable to select high-risk patients for more aggressive therapeutic procedures such as radical debridement, lavage systems, open management, and planned reoperations[2]**.** An accurate risk index classification is the only way to settle a standard of comparison between groups of patients and different treatment methods which would allow further prospective adequate comparative studies. Mannheim peritoneal index(MPI) is one such scoring index which is shown to have role in predicting mortality[3]. This study aims to look at the predictive value of Mannheim index in cases of peritonitis seen in our hospital.

II. Materials & Methods

A prospective study of 60 patients with peritonitis hospitalized in our general surgery department were included in our study over the course of three years from 2016 to 2019.
Exclusion criteria:

- Patients with concomitant chest pathologies,
- preexisting organ failure,
- preexisting metabolic abnormalities.

Risk factor	Scores
Age >50 years	5
Female gender	5
Organ failure*	7
Malignancy	4
Preoperative duration of peritonitis >24 h	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudates	
Clear	0
Cloudy, purulent	6
Fecal	12

*Kidney failure = Creatinine level >177 umol/L or urea level >167 mmol/L or oliguria <20 ml/h; pulmonary insufficiency = PO_2 <50 mmHg or PCO_2 > 50 mmHg; intestinal obstruction/ paralysis >24 h or complete mechanical ileus. MPI- Mannheim Peritonitis Index

III. Observation & Results

1. In our study, the majority of patients were over the age of 50 years and were male. While age did not have a significant role in predicting mortality, sex was weakly predictive of mortality.
2. 40% of patients who came to casualty had organ failure. Organ failure as an index had significant value in predicting mortality.

Crosstab

			Score			Total
			<= 20	21 - 29	> 29	
Organ failure	no	Count	28	7	1	36
		%	77.8%	19.4%	2.8%	100.0%
	yes	Count	0	5	19	24
		%	0.0%	20.8%	79.2%	100.0%
Total		Count	28	12	20	60
		%	46.7%	20.0%	33.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	43.889[a]	2	.0005
Likelihood Ratio	56.520	2	.000
N of Valid Cases	60		

3. 68% of patients had peritonitis for longer than 24 hours, which was highly significant in predicting morbidity & mortality as increased duration of peritonitis was associated with higher scoring.

Duration of peritonitis > 24 hrs * Score

Crosstab

			Score			Total
			<= 20	21 - 29	> 29	
Duration of peritonitis > 24 hrs	no	Count	15	4	0	19
		%	78.9%	21.1%	0.0%	100.0%
	yes	Count	13	8	20	41
		%	31.7%	19.5%	48.8%	100.0%
Total		Count	28	12	20	60
		%	46.7%	20.0%	33.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.492[a]	2	.0005
Likelihood Ratio	20.970	2	.000
N of Valid Cases	60		

4. The most common organ involved was small intestine which was around 26% closely followed by stomach(25%)& appendix(23%).
5. Diffuse generalized peritonitis was usually associated with a higher scoring and was found to be a significant predictor for mortality by itself.

Diffuse generalised peritonitis[6] * Score

Crosstab

			Score			Total
			<= 20	21 - 29	> 29	
Diffuse generalised peritonitis[6]	no	Count	19	3	0	22
		%	86.4%	13.6%	0.0%	100.0%
	yes	Count	9	9	20	38
		%	23.7%	23.7%	52.6%	100.0%
Total		Count	28	12	20	60
		%	46.7%	20.0%	33.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.012[a]	2	.0005
Likelihood Ratio	30.198	2	.000
N of Valid Cases	60		

6. In our study, it was noted that higher score resulted in higher duration of stay in both ICU & overall hospital stay. But lower score is not a good predictor for ICU requirement.

Descriptives

		N	Mean	Std. Deviation	Std. Error	Interval for Mean Lower Bound	Interval for Mean Upper Bound	Minimum	Maximun
Duration of ICU	<= 20	10	1.200	.4216	.1333	.898	1.502	1.0	2.
	21 - 29	12	1.667	.6513	.1880	1.253	2.081	1.0	3.
	> 29	20	3.400	.7539	.1686	3.047	3.753	2.0	5.
	Total	42	2.381	1.1884	.1834	2.011	2.751	1.0	5.
Duration of hospital stay	<= 20	28	2.929	1.0157	.1920	2.535	3.322	2.0	6.
	21 - 29	12	4.583	1.2401	.3580	3.795	5.371	3.0	7.
	> 29	20	5.350	1.7252	.3858	4.543	6.157	3.0	8.
	Total	60	4.067	1.7160	.2215	3.623	4.510	2.0	8.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Duration of ICU	Between Groups	40.838	2	20.419	46.661	.0005
	Within Groups	17.067	39	.438		
	Total	57.905	41			
Duration of hospital stay	Between Groups	72.410	2	36.205	20.367	.0005
	Within Groups	101.324	57	1.778		
	Total	173.733	59			

Post Hoc Tests

Multiple Comparisons

Tukey HSD

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	Interval Lower Bound	Interval Upper Bound
Duration of ICU	<= 20	21 - 29	-.4667	.2832	.238	-1.157	.223
		> 29	-2.2000*	.2562	.0005	-2.824	-1.576
	21 - 29	<= 20	.4667	.2832	.238	-.223	1.157
		> 29	-1.7333*	.2416	.0005	-2.322	-1.145
	> 29	<= 20	2.2000*	.2562	.000	1.576	2.824
		21 - 29	1.7333*	.2416	.000	1.145	2.322
Duration of hospital stay	<= 20	21 - 29	-1.6548*	.4600	.002	-2.762	-.548
		> 29	-2.4214*	.3903	.0005	-3.361	-1.482
	21 - 29	<= 20	1.6548*	.4600	.002	.548	2.762
		> 29	-.7667	.4868	.265	-1.938	.405
	> 29	<= 20	2.4214*	.3903	.000	1.482	3.361
		21 - 29	.7667	.4868	.265	-.405	1.938

IV. Discussion & Results

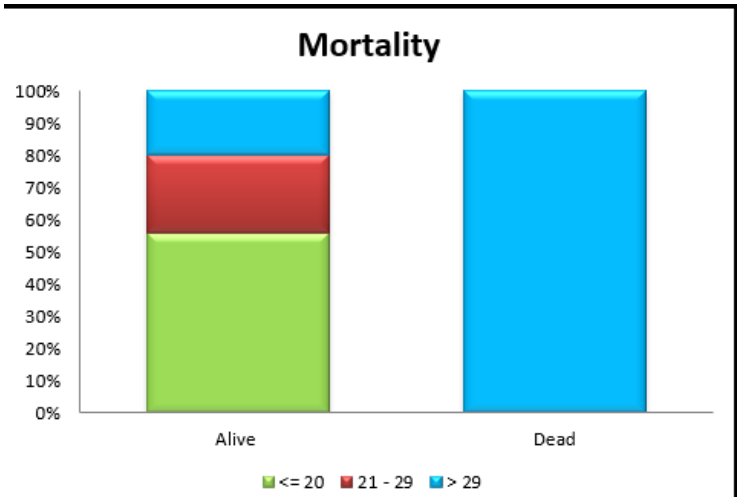
- While there are many scoring systems to predict prognosis of peritonitis, Mannheim peritonitis index is considered & better than APACHE grading[4].
- Basnet *etal*& Linder *etal* have reported good predictive value of Mannheim peritoneal index in cases of peritonitis[5,6].
- Our study achieves similar results in predicting mortality showing that higher scores are significantly good predictors of mortality.

Crosstab

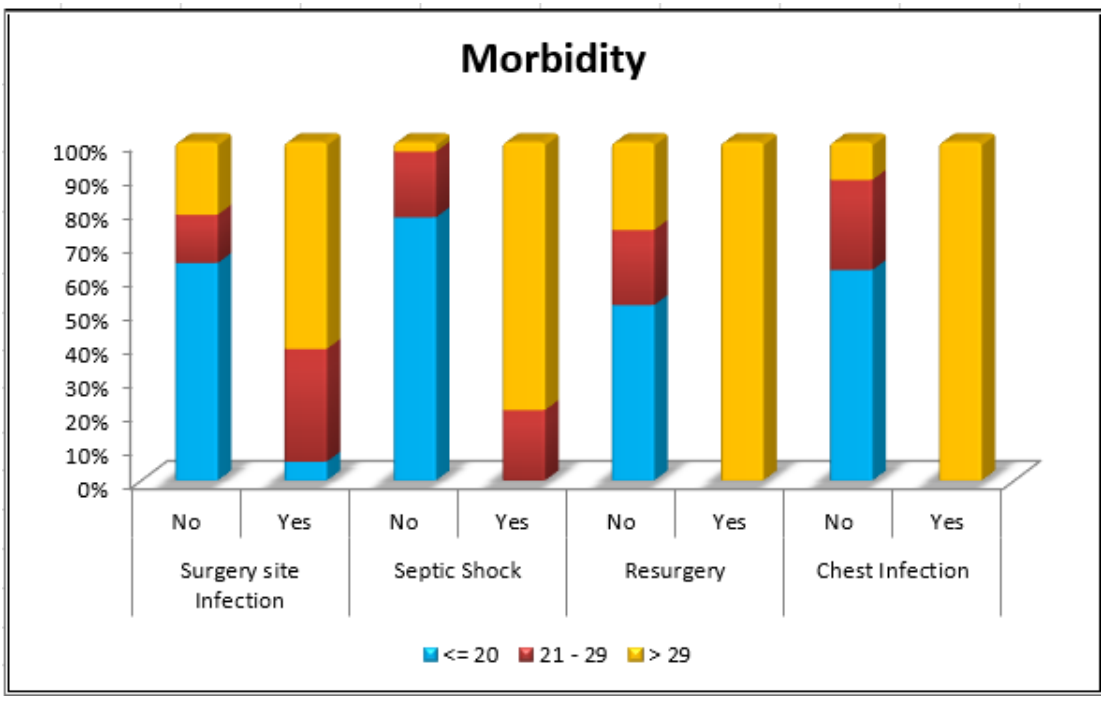
			Score <= 20	Score 21 - 29	Score > 29	Total
died	no	Count	28	12	10	50
		%	56.0%	24.0%	20.0%	100.0%
	yes	Count	0	0	10	10
		%	0.0%	0.0%	100.0%	100.0%
Total		Count	28	12	20	60
		%	46.7%	20.0%	33.3%	100.0%

Chi-Square Tests

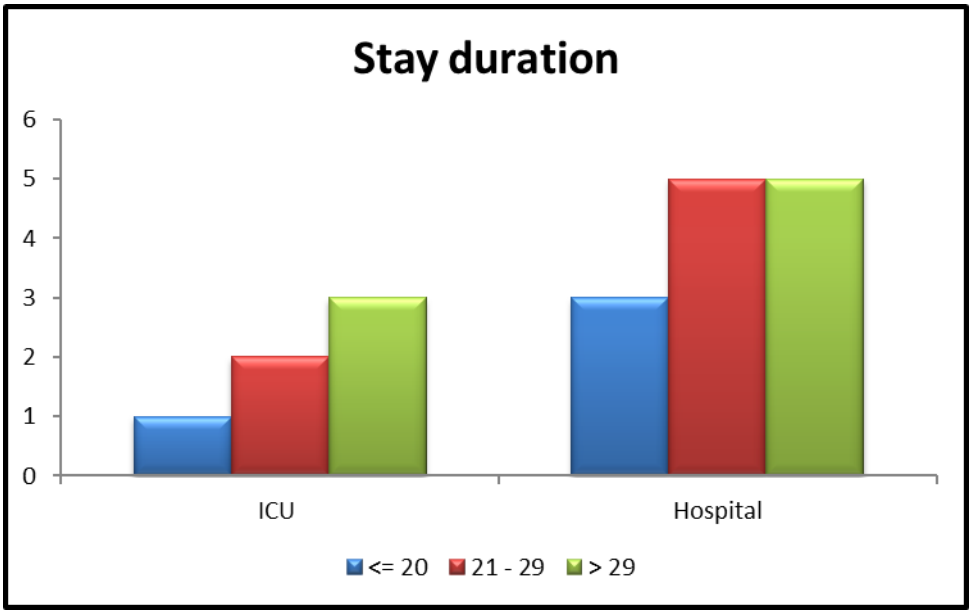
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.000[a]	2	.0005
Likelihood Ratio	26.341	2	.000
N of Valid Cases	60		



- 50% of patients belonging to grade>29 died inspite of best managing practices[8].
- While some individual indices had good prediction, their overall reliability is not consistent. This has also been borne out by Ali&Javed*etal*[7].



- Regarding morbidity, 55% of patients belonging to score >29 had surgery site infection. This group of patients may benefit by delayed primary closure
- 79% of patients with shock had grade>29 which necessitated prolonged intensive care.
- 30% of patients with grade >29 required resurgery. More significantly the patients who required resurgery all belonged to this grade.



- In our study, it was noted that higher the grade of Mannheim index, longer is the duration of hospital stay.

V. Conclusion

Peritonitis is one of the most commonly encountered emergency in emergency setting. Risk stratification enables us to decide on priority in surgery, prognosis & also on level of management. It can also be beneficial to primary or secondary care surgeons to enable decision making on referral if required. Based our study, we conclude that Mannheim Peritoneal Index is one such reliable scoring system due to its ease in calculation & reproducibility.

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