

IS THE MANNHEIM INDEX STILL USEFUL IN THE PROGNOSIS OF PATIENTS WITH SECONDARY ACUTE PERITONITIS?

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IS THE MANNHEIM INDEX STILL USEFUL IN THE PROGNOSIS OF PATIENTS WITH SECONDARY ACUTE PERITONITIS? (Abstract): Digestive tract perforations or anastomotic dehiscence are the main causes of secondary acute peritonitis, in 80% of cases rapid surgical intervention combined with antibiotic therapy leads to a favorable prognosis. The Mannheim index represents a simple and inexpensive score used in acute peritonitis, which was originally derived from a study on 1253 patients with peritonitis treated between 1963 and 1979. **Material and methods:** We performed a retrospective study on 185 patients, hospitalized with the diagnosis of acute peritonitis who underwent surgery, in the general surgery clinic of the Emergency Clinical Hospital “Bagdasar-Arseni” Bucharest between 2016 and 2019. The patients were grouped into 4 risk groups according to the Mannheim index as follows: < 12, 12 - 20, 21 - 27, > 27. **Results:** A value of the Mannheim index below 12 was recorded in 75 patients with a mortality of 8%, values between 12 and 20 were in 59 patients with a mortality of 13.55%, values between 21 and 27 were in 40 patients with a mortality of 25% and a Mannheim index value above 27 were in 11 patients with a mortality of 63.63%. **Conclusions:** The Mannheim Index may be a useful predictor of progression, and further analysis may be beneficial to explore this relationship further. **Keywords:** PERITONITIS, DIGESTIVE PERFORATION, PEPTIC ULCER, MANNHEIM INDEX.

Digestive tract perforations or anastomotic dehiscence are the main causes of secondary acute peritonitis, in 80% of cases rapid surgery combined with antibiotic therapy leads to a favorable prognosis (1), however, mortality remains high ranging between 17 and 63% (1-6). Severe forms of

peritonitis are accompanied by a systemic inflammatory response whose intensity is difficult to anticipate, so we can use the Mannheim index, which represents a simple and cheap prognostic method (7, 8).

The Mannheim index represents a simple and inexpensive score used in acute

Is the Mannheim index still useful in the prognosis of patients with secondary acute peritonitis?

peritonitis, which was originally derived from a study of 1253 patients with peritonitis treated between 1963 and 1979 (7). It was composed by analyzing 17 risk factors among which 8 represented prognostic factors, being widely used in the prediction of mortality from acute peritonitis (9).

MATERIAL AND METHODS

We performed a retrospective study on 185 patients, hospitalized with a diagnosis of acute peritonitis and operated on, in the general surgery clinic of the Emergency

Clinical Hospital “Bagdasar-Arseni” Bucharest between 2016 and 2019. The patients were grouped into 3 groups of risk, < 21, between 22 and 29 respectively > 30, and then in 4 risk groups according to the Mannheim index (Table 1) as follows: < 12, 12 - 20, 21 - 27, > 27.

The data obtained from the analysis of the variables recorded from the patients were subjected to statistical analysis through *Microsoft Excel* and *SPSS* applications, using Crosstabulation, Chi-Square, and Symmetric Measures tests.

TABLE I.
Mannheim peritonitis index

Mannheim peritonitis index	
Risk Factor	Score
Age > 50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Preoperative duration of peritonitis	4
Intraperitoneal exudates	
Clear	0
Cloudy, purulent	6
Fecal	12
Organ failure	
Kidney	
Creatinine level	≥ 177 μmol/L (≥ 2,31 mg/dL)
Urea level	≥ 167 mmol/l (≥ 467,78 mg/dL)
Oliguria	<20 ml/h
Lung (mmHg)	
PaO ₂	< 50
PaCO ₂	> 50
Shock	Hypodynamic or hyperdynamic
Intestinal obstruction (only if profound)	With paralytic ileus > 24 h, complete mechanical

RESULTS

Of the 185 patients included in the study, we had a total of 115 male patients (62.2%) and 70 female patients (37.8%),

aged between 9 and 86 years, with a value average of 51.46 years and a median of 49 years, 48.64% aged over 50 years, most of the patients in the studied group, 60.54%,

coming from the urban environment.

A percentage of 92.43% of patients presented as an emergency, and the most common causes of peritonitis were represented by acute appendicitis with a percentage of 27.6% and perforated ulcer with a percentage of 24.9%, only 16.76% of the causes of peritonitis being of a malignant nature. The onset of symptoms was in most patients more than 72 hours before presentation to the emergency room, the most important symptoms being abdominal pain, nausea, and vomiting. We also mention the fact that at the presentation a percentage of 56.8% of the patients presented a good general condition, 25.4% presented an alteration of the general condition, and 15.7% of the patients at the time of presentation had established toxic-septic shock.

At the time of presentation, organ failure was found in 18 patients, in most cases, 10, being multiple organ failure.

Regarding the intraoperative appearance, in 55.68% of cases, the peritonitis was generalized, the appearance of the intraperitoneal fluid in 52.4% of cases was

clear, in 37.3% purulent, in 6.5% fecaloid and 3.8% bilious.

Out of a total of 185 patients, 154 (83.2%) showed a favorable evolution, while 31 died, thus registering a mortality of 16.75%.

The values of the Mannheim index were between 0 and 43 with an average of 15.43 and a median of 15. We decided to group the patients into 3 risk groups, < 21, between 22 and 29 respectively > 30 according to the Mannheim index, in the group with values below 21 were 149 patients of which 13 died, revealing mortality of 8.72%, in the group with values between 22 and 29 we had 27 patients of which 10 died, revealing mortality of 37%, and in the group with values over 29 we had 9 patients, 6 of whom died, revealing mortality of 66.66%. (tab. II). The data were analyzed statistically; thus, Chi-Square tests were performed obtaining a p-value between 0.000000554 and 0.000000087 and Symmetric Measures with a p-value between 0.000000554 and 0.000242805.

TABLE II.
Distribution of patients by Mannheim Index and mortality

		Favorable	Death	Total	Mortality (%)
Mannheim Index	< 21	134	13	149	8.72
	22 - 29	17	10	27	58.82
	>29	3	6	9	66.66
Total		154	31	185	16.75

Since the mortality in the group with values between 22 and 29 and in the group with values above 29 was approximately close, we decided to group the patients into 4 categories according to the Mannheim index as follows, < 12, between 12 and 20, between 21 and 27 and >27. Thus, in the group with a value below 12, only 75 patients were registered, out of which 6 died,

revealing a mortality rate of 8%, in the group with values between 12 and 20, there were 59 patients, of which 8 died, revealing a mortality rate of 13.55%, in the group with values between 21 and 27 there were 40 patients of which 10 died revealing a mortality rate of 25% and in the group with Mannheim index value over 27 there were 11 patients of which 7 died revealing a

Is the Mannheim index still useful in the prognosis of patients with secondary acute peritonitis?

mortality rate of 63.63%. (tab. III) The data were analyzed statistically; thus, Chi-Square tests were performed obtaining a p-

value between 0.00001824 and 0.00024998 and Symmetric Measures with a p-value between 0.00001183 and 0.00008787.

TABLE III.
Distribution of patients by Mannheim Index and mortality

		Favorable	Death	Total	Mortality (%)
Mannheim Index	<12	69	6	75	8.00
	12 - 20	51	8	59	13.55
	21 - 27	30	10	40	25.00
	>27	4	7	11	63.63
Total		154	31	185	16.75

DISCUSSION

Mortality in acute peritonitis is between 6 and 40% (2, 10-15), an important risk factor being organ failure (16) in our study, mortality was 16.75%.

In our study, 62.16% of patients were male, compared to other studies in which 70.6% of patients were male (10) but also different from other studies in which the percentage of male patients was between 43 and 52% (11, 13). At the same time, the studies do not record gender as a risk factor in acute peritonitis (10, 11, 13).

In many studies, Mannheim index values are divided into 3 groups: under 21, associated with low mortality, between 21 and 29 and over 29, associated with a mortality rate of up to 100% (12, 17, 18), many authors consider that a Mannheim index greater than 26 is associated with high morbidity and mortality (2, 5, 8, 10, 11, 17, 19-21).

In our study, in the case of Mannheim index values below 21, we had a mortality of 8.72%, the group with a value between 22 and 29 had a mortality of 58.82%, and patients with values above 29 had a mortality of 66.66%. For better statistical relevance in our study, we divided the patients into 4 categories according to the Mann-

heim index as follows, < 12 associated with a mortality of 8%, between 12 and 20 associated with a mortality of 13.55%, between 21 and 27 associated with a mortality of 25% and >27 associated with a mortality of 63.63%. This fact indicates that this prediction cannot be applied individually in terms of making therapeutic decisions in a single individual, a fact also confirmed by multicenter studies performed on large groups of patients (2, 10).

Contrary to the statements previously mentioned, certain studies support the fact that the Mannheim index can be used as a criterion in choosing the optimal treatment of acute peritonitis (17, 18, 20), laparoscopic treatment is indicated for a Mannheim index with a value below 29 (10, 17, 22, 23).

The Mannheim index represents a severity score that is easy to use in the clinic, studies that compared it with the APACHE II score, peritonitis index of Altona, and sepsis severity score demonstrated its value, being equal or superior in assessing the prognosis (5, 12, 18, 24, 25).

CONCLUSIONS

The Mannheim index is a useful score in predicting mortality in acute peritonitis.

Based on the results obtained in our study we can conclude that there is a significant association between the Mannheim index and the evolution of patients. The Mannheim index may be a useful predictor of progression, and further analysis may be beneficial to explore this relationship further.

CONFLICT OF INTEREST AND FUNDING

The authors declare that there is no conflict of interest, and they received no specific funding regarding this scientific research.

RESEARCH ETHICS STATEMENT

The research was conducted with the Approval of the Ethics Committee of “Bagdasar-Arseni” Clinical Emergency Hospital.

AUTHORS' CONTRIBUTION

The first and the second authors contributed equally to this paper's achievement.

DISCLAIMER

The data presented in the article are part of a larger study, which is part of a Ph.D. thesis.

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Is the Mannheim index still useful in the prognosis of patients with secondary acute peritonitis?

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