The Predictive Value of Mannheim Score in Patients with Colon Related Peritonitis

Teleanu G[1], Iordache F[2], Beuran M[2]

[1] General Surgery Clinic I, Clinical Emergency Hospital Floreasca, Bucharest, Romania
[2] Faculty of Medicine, University of Medicine and Pharmacy, Bucharest, Romania

Introduction: The aim of this study, is to confirm the predictive value of the Mannheim peritonitis index at the patients with colonic peritonitis.
Material and method: From January 2003 to October 2007 in Surgical Department of Emergency Hospital Bucharest, 98 cases were studied and the patients were divided into two groups according to the Mannheim Peritonitis Index value 24.
Results: A life table was constructed to compare patients survival rate. Patients with Mannheim Peritonitis Index less than or equal to 24 had a mortality not reach 6% and patients with Mannheim Peritonitis Index greater than 24 had a mortality rate of 45%.
Conclusions: The Mannheim Peritonitis Index is a useful method to determine study group in patients with colonic peritonitis. He has a predictive value of outcome at the patients with colonic peritonitis.

Keywords: colonic peritonitis, Mannheim peritonitis index, score systems

Received: 9 April 2011 / Accepted: 31 July 2012

Introduction

Infectious peritonitis still represents a challenge for surgeons everywhere. Despite all breakthroughs in antimicrobial therapy associated with improved critical care, the mortality rate following peritonitis remains as high as 10–20%.

The progress of all patients with intra-abdominal infections is related to a number of interconnected factors, a positive outcome being ensured by an adequate treatment. An exact diagnosis as well as an accurate examination and effective risk classification are also important factors influencing the patient outcome.

The surgeon employs abdominal sepsis scores in order to assess the patient, to select the appropriate treatment, to compare various patient groups and to be able to select the cases requiring an aggressive surgical approach. In an attempt to determine the prognosis in patients with abdominal sepsis it is necessary to select the patients in need of extensive surgical treatment: broad debridment, lavage systems, laparostomies, scheduled interventions.

Several predictive scores for critical patients have been proposed over the last few decades. The only way to compare various patient groups and treatment approaches is to employ an accurate severity score classification, enabling us to conduct prospective studies in this field.

An early and objective assessment of severe peritonitis allows us to select the patients in need of more aggressive surgical treatment. Various severity scores have been described, such as: Acute Physiology and Chronic Health Evaluation (APACHE II), Simplified Acute Physiology Score (SAPS), Sepsis Severity Score (SSS), Ranson Score, Imrie Score, Mannheim Peritonitis Index. Because most septic patients develop organ disfunction and end-stage organ failure, they need to be permanently monitored in an intensive care unit. In 1985 Goris et al [1] published the MOF score-Multiple Organ Failure Score.

One of the most common scoring systems used today is APACHE II, which embeds multiple physiological parameters recorded during the first 24 hrs in the intensive care unit. However, this is a fairly complex score, requiring time and equipment, but it allows an accurate risk factor grading. APACHE II is a predictive scoring system for patient evolution, but it is not reliable in small hospitals, without intensive care facilities.

Many other scoring systems evaluating the risk of death of patients with peritonitis have been described, with Mannheim Peritonitis Index (MPI) being the most reliable in terms of predictive value.

Wacha and Linder [2] were the first to describe the MPI in 1983. It was created based on a retrospective study that yielded 1253 patients with peritonitis. Initially, 20 possible risk factors have been considered, but only 8 have been granted predictive relevance and ultimately included in the MPI. Patients with a score higher than 26 were considered to have an increased mortality rate.

Because MPI is determined by using data available in the observational charts, it is possible to conduct retrospective studies.

Due to its simplicity, MPI can become a standard scoring system, easy to use, particularly in small hospitals.

It it currently employed by several European and some South-American hospitals, but it is absent in North-American clinical studies [3].

The Department of Surgery of the Clinical Emergency Hospital in Bucharest has conducted a study to evaluate the predictive value of MPI in patients diagnosed intraoperatively with colon-related peritonitis.

The purpose of this study was that of assessing the severity of colonic peritonitis and creating a prognosis scoring system for these patients.

Correspondence to Gabriel Teleanu
Email: gabtel6@hotmail.com

Table I. Parameters necessary to calculate MPI

Risk factors	Points
Age >50	5
Female gender	5
Organ failure	7
Malignancy	4
Preoperatory period >24 hrs	4
Non-colonic peritonitis	4
Generalized peritonitis	6
Clear exsudate	0
Cloudy, purulent exsudate	6
Fecal exsudate	12

Material and method

We conducted a retrospective study in our Department of Surgery of the Clinical Emergency Hospital in Bucharest, between January 2003 and October 2007. The patients included in this study were both males and females, the youngest case being 22 years old. All patients that did not have the diagnosis of colon-related peritonitis confirmed intraoperatively have been excluded from the study.

All cases have been selected only after intraoperative confirmation of peritonitis, the data having been obtained from operative notes. We also gathered data from observational charts and we determined the MPI by employing the variables presented in Table I.

The patients' progress has been evaluated based on data collected from observational charts, including complications, death or positive outcome and discharge.

The minimal possible score was 0, risk factor-free, and the maximum score was 47, with all risk factors included. The patients were divided into 2 groups in relation to the determined MPI value.

Using Billing's study as a reference, we considered an average MPI of 24 as a standard value for dividing our patients in two groups.

RESULTS

Between January 2003 and October 2007, 98 patients were admitted to the Department of Surgery of the Clinical Emergency Hospital in Bucharest, having been diagnosed during surgery with colon related peritonitis.

Our group was divided in 55.1% male and 42.9% female patients. The average age of surviving patients was 42.3 years compared to that of deceased patients, which was 65.1 years.

Out of all operated patients 11 have died, which sets the overall mortality rate at 11.7%.

79.3% of surviving patients had a complication-free progress. 20.6% of those that survived had postop complications: 11 patients had wound suppurations, 1 patient with wound dehiscence that required secondary closure, 1 patient developed postop intrabadominal abcesses, 1 patient had early onset postop obstruction that required reintervention, 3 patients developed respiratory failure and 2 patients had renal failure, one case having remitted to treatment.

Table II. Patient groups and MPI values

Risk factors	IPM≤24		IPM>24	
	Patients	Deaths	Patients	Deaths
Age >50 years	24	3	18	5
Age <50 years	32	1	13	2
Male	30	3	18	3
Female	28	4	16	1
With organ failure	2	3	10	4
No organ failure	55	0	20	4
Malignancy	8	2	12	5
No malignancy	38	1	33	3
>24 hrs	30	1	20	7
<24 hrs	22	1	15	2
Colon related	46	3	41	8
Localized peritonitis	45	0	7	3
Generalized peritonitis	30	2	8	6
Clear peritoneal fluid	9	0	5	0
Purulent peritoneal fluid	38	1	13	3
Fecal peritoneal fluid	6	1	16	6

The mean hospital stay was 17.8 days, with periods ranging between 0 and 30 days.

Nine operated patients needed continous monitoring in the Intensive Care Unit.

The main causes for colonic peritonitis included: blunt abdominal trauma with colon injury in 4 patients (4%), stab wounds with colon injuries in 11 cases (10.7%), gunshot wound to the abdomen with colon injury in 1 case (1%). There were 17 cases(16.6%) with mixed colon-small bowel peritonitis, 18 cases (17.6%) of perforated colonic tumors, 6 cases (5.8%) of diastatic perforations, 11 cases (10.7%) of perforated diverticulitis, 8 cases (7.8%) of volvulus and sigmoidal necrosis, 8 cases (7.8%) of peritonitis by permeation and 14 cases (13.7%) with mixed etiologies.

Out of all surviving patients with peritonitis, 52 had localized peritonitis (53%) and 35 had generalized peritonitis (47%). Eight patients (72.7%) that eventually died had generalized peritonitis and 3 patients (27.2%) had localized infection.

The average MPI value for surviving patients was 13 opposed to an MPI value of 30 for patients that died.

The average value of 24 for the MPI has been set as a reference value. Therefore, the patients with an MPI>24 had a mortality rate of over 45%, whilst those with an MPI ≤24 had a mortality rate of less than 6%.

For surviving patients the average value of MPI was 13 and for the deceased patients the average value was 30.

Using the χ^2 test, with α=0.05, we were able to establish that the mortality rate was significantly higher for patients with MPI>24 compared to those with an MPI ≤24 ($p<0.01$).

All patients were divided in 2 groups, based on an MPI value of 24, the results being displayed in Table II.

Discussions

The overall mortality rate is comparable with other studies reporting mortality rates ranging between 3.9% and 54% [2,8–14,16].

The MPI efficacy as a predictive factor in peritonitis has been confirmed by clinical studies embeding over 2000 patients from multiple European surgical departments [15,16].

Some authors consider the predictive differences between MPI and APACHE II as being insignificant, actually suggesting combining both scoring systems in an attempt to improve their efficiency.

The Mannheim index employs clinical parameters obtained from pre-op monitoring and intra-op observations. The initial grading is based on data retrieved during laparotomy.

An early severity evaluation according to the MPI allows an overall estimate of the patient's prognosis. MPI is readily available and one of the most easy-to-use scoring systems employed by surgeons worlwide in order to estimate the prognosis of patients with peritonitis [6].

Conclusions

Our study included only patients with colonic peritonitis, MPI value of 24 is significant. It has been statistically determined that the mortality rate is higher in patients with an MPI>24 than patients with MPI≤24.

We can, therefore, say that the MPI has a predictive value when assessing patients with colonic peritonitis, with a reference value smaller than that for non-colonic peritonitis.

The APACHE II score as having a higher predictive value than the MPI, allowing the possibility to determine more accurately the prognosis for abdominal sepsis patients. However, the MPI has the main advantage of being much more easily employed.

Combining both scoring systems — APACHE II and MPI — can only increase the predicitive efficiency in all patients with colonic peritonitis.

The Mannheim score is relatively easy to determine, hence aplicable in small hospitals without high dependency units.

References

1. Goris RJA, te Boekhorst TPA, Nuytinek JKS, Gimbrane JSF. Multiple-organ failure generalized autodestructive inflammation. Arch Surg 1985;44:937-946.
2. Linder MM, Wacha H, Feldmann U, Wesch G, Streifesand RA – Der Mannheimer peritonitis-index. Ein instrument zur intraoperativen prognose der peritonitis. Chirurg 1987;58(2);84-92.
3. Knaus WA, Zimmerman JE, Wagner DP, Draper DA, Lawrence DE – APACHE – acute physiology and chronic health evaluation; a physiologically based classification system. Crit care Med 1981;9:591-597.
4. Pacelli F, Battista DG, Alfieri S, Piccioni E, Sgadari A, Gui D, et al. Prognosis in intra-abdominal infections. Arch Surg 1996;131(6):641-645.
5. Rodolfo L, Bracho-Riquelme MC, Armado Melero-Vela, Aidee Torres-Ramirez. Mannheim peritonitis index validation study at the Hospital General de Durango (Mexico). Cir Ciruj 2002;70:217-225.
6. Seiler CA, Brugger L, Forssmann U, Baer HU, Buchler MW. Conservative surgical treatment of diffuse peritonitis. Surgery 2000 Feb;127(2):178-184.
7. Bergamaschi R, Marvik R, Johnsen G, Thoresen JE, Ystgaard B, Myrvold HE. Open vs laparoscopic repair of perforated peptic ulcer. Surg Endosc 1999;13(7):679-682.
8. Brugger LE, Seiler CA, Mittler M, Balsiger B, Feodorovici M, Baer HU, Buchler MW. New approaches to the surgical treatment of diffuse peritonitis. Zentralbl Chir 1999;124(3):181-186.
9. Liverani A, Correnti SF, Paganelli MT, Antonini G, Mercati U. Mannhein index in the prognosis and treatment of acute peritonitis. Minerva Chir 1998;53(5):385-389.
10. Ohmann C, Hau T. Prognostic indices in peritonitis. Hepatogastroenterology 1997 Jul-Aug;44(16):937-946.
11. Nespoli A, Ravizzini C, Trivella M, Segala M. The choice of surgical procedure for peritonitis due to colonic perforation. Arch Surg 1993;128(7):814-818.
12. Sautner T, Götzinger, Redl-Wenzl EM, Dittrich K, Felfernig M, Sporn P, et al. Does reoperation for abdominal sepsis enhance the inflammatory host response? Arch Surg 1997;132:250-255.
13. Rodríguez-Gojón GH, Pérez-García R, Poblano-Morales M, Rodríguez-Brambilia V, Chavero-Garcia V. Factores pronósticos asociados a mortalidad en pacientes con sepsis abdominal tratados en la unidad de terapia intensiva. Cir Cir 1999;67(6):205-207.
14. Bosscha K, Reijnders K, Hulstaert PF, Algra A, Vander Werken C. Prognostic scoring systems to predict outcome in peritonitis and intraabdominal sepsis. Br J Surg 1997;84:1532-1534.
15. Billing A, Frolich D, Schildberg FW. Prediction of outcome using the Mannheim peritonitis index in 2003 patients. Br J Surg 1994;81:209-213.
16. Demmel M, Maag K, Osterholzer G. Wertigkeit klinischer parameter zur prognosebeurteilung der peritonitis – Validierung des Mannheimer peritonitis index. Langenbecks Arch Chir 1994;379; 152-158.