

PROGNOSTIC FACTORS IN ACUTE SECONDARY PERITONITIS : A CASE CONTROL STUDY

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Abstract - The mortality associated with secondary peritonitis has been unacceptably high. This is despite improvements in diagnosis and surgical methods. The risk factors affecting outcome have been only partially elucidated. The records of 303 patients with the established diagnosis of generalized peritonitis were studied retrospectively for various prognostic factors and their outcomes. The associations of probable risk factors were examined by performing logistic regression on outcome. Age, the white blood cell (WBC) count above 20000 cells/mm³, site of infection, mechanism of infection and male sex were associated with mortality rate. Perforation as the mechanism of intra-abdominal infection was surprisingly associated with better prognosis, and the WBC count (less than 20000 cells/mm³) and fever showed no significant association with mortality. The observations demonstrate that in patients with potential risk factors, a more aggressive method including earlier surgical management is needed.

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INTRODUCTION

Secondary peritonitis, by far the most common form of peritonitis, refers to peritoneal infection arising from an intra-abdominal source, usually a perforation of a hollow viscus. The majority of these episodes are the result of primary lesions of the stomach, duodenum, small intestine, colon and appendix.

Nearly 10% of cases are caused by complications of abdominal surgery.

Secondary peritonitis has been one of the most serious problems encountered by surgeons. Despite recent advances, the mortality of secondary peritonitis has remained unacceptably high. For many years, the association of some factors with high mortality in peritonitis had been recognized and many researches has been made on this subject(1). In spite of such extensive investigations, many points are still unclear (2).

In addition, some recommendations that were accepted previously, have been doubted and need to be

reevaluated. In this study, an effort was made to answer some of these questions. Various factors known as potentially associated with prognosis were analyzed for their influence on survival. The study has the advantage of assessing the relationship between the most interesting factors to the peritonitis mortality. It also had the advantage of adjusting the effect of any relationship between independent variables by logistic regression.

MATERIALS AND METHODS

The records of 324 patients admitted to the surgical wards of the Imam Khomeini Hospital of Tehran between 1981 and 1996 were reviewed retrospectively. Data between 1981 and 1996 were chosen to be examined because a uniform and complete data registry system was used during this period. Valid studies performed on data found an overall data entry error rate of approximately 1% .

Since the Imam Khomeini Hospital Center is a large, general and university hospital, patients were from all different groups of society. It's also located nearly in the center of Tehran which facilitates the above criteria. So we can trustfully consider the studied patients as a satisfactory sample of all society. From 324 cases registered with the diagnosis of peritonitis, 21 had missing values on the risk factors of interest, the 303 remaining cases were reviewed in the study.

Each patient was tested for body temperature, signs and symptoms of irritated peritoneum, WBC with different count and some other laboratory values on arrival in the Emergency Room. The diagnosis of peritonitis was established if at laparotomy free purulent fluid or gastrointestinal content was present in the peritoneal cavity. Fever was noted if oral temperature exceeded 37.8^o C and the polymorphonuclear (PMN) cells predominance were defined as the WBC count above 11000 cells/mm³ and the PMN cells more than 60%, respectively, at the time of admission and before operation. Mortality was defined as death in the hospital during the same admission as the episode of peritonitis.

Percentages have been calculated as a proportion of the whole group. Risk factors included were age, sex, cause of peritonitis, site and mechanism of intra-abdominal infection, the number and differential count of the WBC, presence or absence of fever and death because of the disease. A case-control study was performed by comparing deceased peritonitis patients with those peritonitis patients who survived. Since it is well known that the prevalence of some abdominal pathologies leading to peritonitis is higher in specific categories of patients, a logistic regression method was used to adjust such relationships. This was especially important for age, sex, mechanism of perforation and site of perforation.

The present study, therefore, offered an opportunity to examine the association between several variables and risk of death from peritonitis. In all analysis, confidential interval (CI) and significance level of P value were chosen as 95% and 0.05, respectively.

RESULTS

Among 303 patients studied (age range 7 to 80 years, mean 43.5, standard deviation 19.13), 177 (41.58%) were men and 126 (58.41%) were women.

The overall mortality figure was 85 (28.05%). There was a male predominance (58.4 1% were male).

The age distribution by sex is given in Table 1 . Mortality among men was significantly higher than women (Odds Ratio [OR] 2.95; Confidence Interval [CI] 1.56-5.58). Perforation was the most common mechanism of infection and appendix was the most common site of pathology in our patients (Tables 2 and 3 represent this data).

Table 1. Age and sex distribution of the patients

AGE (year)	Men(%) (n=177)	Women(%) (n=126)	Sum
0-10	11 (6.2)	7 (5.6)	18
11-20	29 (16.4)	31(24.6)	60
21-40	82 (46.3)	55 (43.7)	137
41-60	30 (16.9)	13 (10.3)	43
61-80	25 (14.1)	20 (15.9)	45

The results of the regression analysis are shown in Table 4. Age was found to be a risk factor (OR 1.02; CI 1.008-1.04). Dividing patients among five categories showed those older than 60 have the highest mortality rate.

No significant association could be demonstrated between high fever and increased risk of death from peritonitis. WBC by itself wasn't a significant risk factor, but the WBC count above 20000 cells/mm³ showed significant association with mortality (OR 4.26; CI 1.11-16.25).

Table 2. mortality vs. Cause of peritonitis

Mechanism of Pathology	Frequency	Mortality, no (%)
Perforation	248	64(25.8)
Ischemic bowel*	12	5 (41.7)
Anastomotic Leak	6	6 (100)
Abscess	36	10 (27.8)
Others	1	0 (0)

* Most of the time perforation occurs as a result of ischemia. But in this study ischemic pathology means presence of ischemia without perforation

Of different sites of pathology, gastroduodenal origin had a significant association with mortality (OR 2.52; CI 1.18-5.40). No other association was found.

Table 3. mortality vs. Site of pathology

Mechanism of Pathology	Frequency	Mortality, no (%)
Gastroduodenal	51	26 (51)
Hepatobiliary	18	4 (22.2)
Small Bowel	40	16 (40)
Colon	1	0 (0)
Appendix	127	19 (15)
Others	66	20 (30.3)

Table 4. Results of logistic regression on variables

Variable	odds ratio (OR)	95% confidence interval	Significance P-value
Age	1.02	1.008-1.04	0.003
Sex	2.95	1.56-5.58	0.001
WBC	0.99	0.99-1.0003	0.25
WBC> 20000	4.26	1.11-16.25	0.034
Fever	0.85	0.45-1.61	0.63
Gastrodeodenal origin	2.52	1.18-5.40	0.017
Small bowel origin	2.08	0.92-4.70	0.078
Colon origin	0.64	0.29-1.40	0.26
Mechanism of infection	1.52	1.15-2.01	0.003
Perforation (mech.)	0.044	0.004-0.43	0.008
Ischemic (mech.)	0.09	0.007-1.33	0.081
Abscess (mech.)	0.13	0.01-1.44	0.098

DISCUSSION

Empirically-based risk assessments for important clinical events have been extremely useful in evaluating new therapies, in monitoring resource utilization, and in

improving quality assessment. There has been considerable controversy regarding the appropriate methods for management of peritonitis patients. Taking the risk of each case into account, the clinician can determine the extent of invasiveness in surgical management. So, it's of the paramount importance to correctly predict the outcome of each patient before deciding the method of treatment (3). The present study was undertaken to review the records of 303 patients with secondary peritonitis and to delineate prognostic factors concerning outcome in these patients. Although one should be cautious to extend the results of a sample analysis to all the general population, we assume that, as explained in methods, this sample was a good representative of the population in general. Using regression analysis was mandatory, since it's widely accepted that age and sex have relationship with type of pathology and site of lesion in secondary peritonitis.

This survey revealed an excess mortality in peritonitis patients compared with controls. Previous studies have shown that age and sex have direct influence on mortality (1,4-13). Dawson in a review of 665 cases of peritonitis, reported an increased mortality rate for higher ages (5). In addition, some investigators have considered age as a risk factor when it's over 70 years (12,14). There are, however, opposite reports which indicates controversy in this regard (15). In our study sex was proved to be a significant risk factor, even after adjusting for cause of peritonitis. This was also true about the age whose association was still significant after adjusting for other variables. Sex didn't prove to be a predictor of death in a study done in France (16), but the number of cases might not have been enough.

It was expected that severe leukocytosis has relationship with mortality rate, since there is a severe reaction of immune system to generalized intra-abdominal infection (4,8,9,11). However, no association could be made between leukocytosis itself and prognosis. Some authors consider localization to be an important prognostic factor (4,17,18). We found that origin of infection influences the outcome, despite reports against this matter (4,15).

Many authors have demonstrated that the appendicular origin of infection is associated with low risk (4,5,19); the significance of this association was resolved in this study after regression analysis. In contrast, gastroduodenal origin was a distinct indicator of poor prognosis which is concordant with observations of many authors (6). In addition, although the association of gastroduodenal origin with high mortality was primarily due to the fact that the patients with the gastroduodenal pathology are both old and male, the risk of death from peritonitis was still higher after adjusting for age. Perforated bowel is reported to have a mortality rate between 20% and 50% (20,21,22).

In the present series, the association was weak and

under the level of significance, yet is worth considering in clinical decisions. The small bowel infections, however, have little value in predicting prognosis, in spite of the fact that colonic origin of perforation is an indicator of poor prognosis (6,20,21,22). Postoperative peritonitis has been shown to be a powerful risk factor by many investigators (4,18,23,24). The power of the present analysis to detect independent association of postoperative peritonitis with prognosis was limited due to the small number of subjects. Perforation was the most common mechanism for peritonitis (25). It was also a predictor of good prognosis in our study. Based on our findings, we recommend to pay special attention and perform emergent operation in patients with the proposed risk factors.

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