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Analysis of Risk Factors in Nontraumatic Perforation Peritonitis- Review from A Rural Medical College

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ABSTRACT

The objective was to retrospectively analyze data of non-traumatic gastrointestinal perforations in a 10 year period from a rural medical college and statistically evaluate the risk factors for mortality. A retrospective study of four hundred and sixty four patients admitted in a span of ten years (between January 1997 to December'2006) was done and data regarding clinical presentation, operative findings, postoperative course were studied and analyzed. The cases of traumatic perforation were excluded. The data was analysed using chi square and binary logistic regression tools. The mortality was 13.79%. The risk factors identified by statistical tools were, factors such as age above 50 years, delay of more than 24 hours for hospitalization, shock on admission (if systolic blood pressure was less than 90 mmHg), associated comorbid conditions, colonic or rectal perforation, prolonged operating time (more than 90 minutes for simple closure and more than 120 minutes for resection) andpost operative complication. The mortality in cases of gastrointestinal perforation depends upon number of the risk factors and their severity. Age of 50 years, shock on admission, pre-existing illness and post operative complications appear to be the more significant factors.

Key words: intestinal perforation, peritonitis, risk factors.

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INTRODUCTION

Peritonitis due to gastrointestinal perforation is a common surgical emergency in all medical colleges. The management of such patients is difficult in a rural set-up due to limited resources in investigative facilities like blood gas analysis and inadequate facilities in the intensive care units. The etiology of gastrointestinal perforation in India is different than in the western countries. Some data is available from India regarding the etiology and prognostic risk factors leading to mortality. There are various scoring systems such as the Acute Physiology and Chronic Health Evaluation (APACHE), Simplified Acute Physiology Score (SAPS), Multiorgan Failure (MOF) and Mannheim Peritonitis Index (MPI)[1, 2, 3, 4] to identify the risk in such patients. However, they are not specific for peritonitis alone. These systems are difficult to implement in a rural hospital set-up. The aim of this study was to identify statistically significant risk factors by using parameters which are easily available, avoiding laboratory parameters so that it could be used to predict mortality in a rural setup with limited access to costly laboratory investigations.

MATERIALS AND METHODS

A cross sectional study was conducted among the patients from rural medical college hospital by using simple random sampling. Sample size calculated by using appropriate statistical formula, yielded a size of 400. Accordingly data of 464 patients with perforation peritonitis (proved by laparotomy) during January'1997 to December'2006 was considered for the analysis. All the patients who consented were included in the study and those who were not willing to participate, traumatic perforations were excluded. Statistical analysis was done by using Microsoft Excel and SPSS trial version 17. Chi-square test and percentages was applied to study relationship between different factors like comparison of various risk factors and relationships between survivors and non survivors. Binary logistic regression method was applied to obtain best and significant predictors of mortality such as age, sex, comorbid factors, shock, postoperative complications etc. Factors which have p value less than 0.05 were considered as significant whereas p value less than 0.01 as highly significant. The history, clinical presentation, laboratory and radiological investigations, operative findings, procedures done and post-operative course were studied. The entire data was collected from outdoor and indoor records, refer-in letters of the patients. Ethical clearance from Institutional Ethical Committee was taken. Co morbid conditions were decided upon by the commonly occuring associated secondary disease conditions observed in this study along with the primary disease. These conditions were then categorized system wise. The criteria used for co-morbid condition in this study were as follows:

Cardio-vascular diseases that includes Ischaemic heart disease of recent origin (6 weeks or less), Cardiac arrhythmias on electrocardiogram, congestive cardiac failure and hypertension.

Pulmonary disease which includes Pulmonary tuberculosis, chronic obstructive pulmonary disease, effusion and bronchiectasis proved on x-ray.

Chronic liver disease having deranged liver function test or ultrasonological evidence of cirrhosis.

Chronic renal failure with serum creatinine more than 2 mgm/dl.

Neurological diseases like cerebrovascular accident with or without paralysis or a history of craniotomy for brain tumours or intra cranial bleeds.

Metabolic causes like diabetes mellitus, Immuno-compromised patients and patients with any malignancy.

RESULTS AND DISCUSSIONS

A total of 464 patients were studied. One hundred and ninety six patients were above the age of 50 years and 268 were below 50 years. The median age was 46.59 years. Three hundred and sixty one were males and 103 were females. The male to female ratio being 3.5:1. The maximum numbers of patients were in the age group of 41 to 60 (Table 1). The most common cause of gastrointestinal perforation was duodenal in 340 cases (73.28%), followed by ileal in 66 cases (14.23%). Of the 66 cases 40 cases were due to typhoid as they were Widal positive and the rest due to tuberculosis as proved by histopathological reports. The duodenal perforations were due to acid peptic disease. Thirteen cases were of jejunal perforation (2.80%). Appendicular perforation was seen in 13 cases. Seven cases of colonic and three cases of rectal perforation were observed (Table 1). The time interval between the onset of abdominal pain and surgical intervention was less than 24 hours in 279 cases (60.13%) and more than 24 hours in 185 cases (39.87%). Seventy three patients (15.7%) were admitted in shock (systolic blood pressure less than 90 mmHg). Prolonged operating time (more than 90 minutes for simple closure and more than 120 minutes for resection) was noted in 151 (32.54%) patients. Comorbid diseases were observed in 72 patients (Table 2). Eighty patients (17.24%) developed postoperative complications. Twenty six (32.5%) developed respiratory complications like pneumonitis or acute respiratory disease syndrome. Thirty five patients (43.75%) developed superficial wound infections which were managed by dressings, ten patients requiring secondary suturing. Wound infection was more common in distal gastrointestinal perforation cases. The surgical procedure was undertaken according to the site and cause of perforation. The gastric and duodenal

perforations due to peptic ulcer disease were closed with Graham's omental patch. Billroth II gastrectomy was performed in two cases of perforation due to gastric malignancy. The jejunal and ileal perforations were closed by simple sutures. Resection of ileal segment was done in cases of strictures due to tuberculosis. Four patients required right hemicolectomy, two of which had caecal perforation due to ileo-caecal tuberculosis and two were due to malignancy. In two cases the colonic perforation was accidental (iatrogenic) in which the perforated colonic segment itself was brought out as colostomy. In one case of descending colon perforation, the definite cause could not be detected. In this (possibly inflammatory) patient also a proximal colostomy was done after closure of the perforation. One case of rectal growth with perforation had extensive peritoneal seedlings and hence only colostomy was done. Two cases of rectal malignancy were treated with anterior resection. In all these cases the peritoneal cavity was irrigated with normal saline. All these patients received broad spectrum antibiotics; however the drug regimen was not uniform. Wound dehiscence (burst abdomen) was observed in 7 patients. All these patients of wound dehiscence were managed by single layer tension sutures. One patient developed anastomotic leak which required re-exploration and revision of anastomosis. The overall mortality was 13.82% (64 out of 464). The mortality was higher 40% in colonic followed by 30.76% in jejunal, 21.21% in ileal, 13.33% in gastric and 11.47% in duodenal perforation. The major cause being septicaemia (62%), followed by respiratory complications 24%, acute myocardial infarction 8%, pulmonary embolism 5% and in 1% definite cause could not be identified. However, it is not the individual risk factor but a combination of different risk factors which predict the mortality. The major risk factors leading to mortality are shock on admission and associated co-morbid conditions with a high chi-square value of 30.478 and 93.96 respectively (Table 3). Furthermore a binary logistic regression (enter method) was used to find out the most significant predictive factors (Table 4). When isolated single risk factor is present (excluding shock and co-morbidity), the mortality was 4.9% (11 out of 224). When shock was present as an additional factor, mortality was 24.39% (10 out of 41). When co-morbidity was present as an additional factor, the mortality was 32.78% .When shock and co-morbid both were present, the mortality increased significantly to 69.56% (16 out of 23). This proves that shock and associated co-morbid conditions were very significant factors leading to mortality. In India peritonitis due to gastrointestinal perforation is a common emergency in surgical departments.[5] Duodenal perforation caused by acid-peptic disease was commonest in this series (73.2%). The incidence of duodenal perforation was more than gastric perforation (22.6:1) which conforms to the other series[6, 7, 8]. The non steroidalanti inflammatory drugs (NSAID) induced cases were only

17. In the series by Chalya PL[9], NSAID induced cases were very high i.e. 69%. In our series gastroduodenal perforations were more than small bowel perforations. Our series had a predominance of small bowel perforations due to typhoid. Chatterjee et al.,[10] also reported a higher incidence of enteric perforations. However, other series from northern parts of the country have reported tuberculosis as a major cause of small bowel perforation[11, 12, 13]. In rural patients presentation to the referral centre is delayed due to lack of education, failure to get timely medical attention and lack of transport facilities. In this series 185 patients (39.8%) were admitted with a delay of more than 24 hours after the onset of abdominal pain. The mortality in this group was 17.30 %. It becomes necessary to identify the risk factors for mortality in perforation peritonitis. In the present series age above 50 years, delay in hospitalisation of more than 24 hours, shock on admission, comorbid conditions large bowel perforation and post operative complications were the predominant risk factors noted. These factors have also been identified as primary risk factors in other series[14, 15, 16]. Co morbid condition indicates the total burden of physiological dysfunction that has an impact on an individual's physiological reserve[17, 18]. The co-morbidity index suggested by Rozzini R et al.[19] in 2002 is restricted only to geriatric group. The assessment of co-morbidity advocated by Litwin M S et al.[20] is restricted only to prostatic cancer. Therefore it is difficult to assess comorbidity using these indices. The overall mortality in this series was 13.79%. The mortality in small bowel perforation is more than gastro duodenal & highest in colonic perforation owing to the higher bacterial presence in these areas. This is also confirmed in other series[21, 22]. Mortality depends upon the risk factors. The mortality in patients above 50 years of age was 21.94%. Advanced age, diabetes, atherosclerosis, and chronic obstructive pulmonary disease contributed to the high mortality. The presence of shock may be due to hypovolaemia or in late cases septicaemia. In both the situations cellular microcirculation gets impaired, leading to cellular hypoxia and lactic acidosis which accelerates the process of multiorgan failure leading to mortality. It may be prudent to mention here that the mere presence of risk factors does not give a correct prognosis. To site a comparative example, if a patient has 3 risk factors viz, delay in presentation, age above 50 years & increased operative time and the other also has 3 risk factors viz age above 50 years, shock on admission & presence of comorbid condition, the predicted higher mortality will be obviously higher in the latter patient, even though the number of risk factors are 3 in both patients. Hence only considering the number of risk factors for predicting mortality is inadequate. To date many scoring systems are available to prognosticate mortality in perforation peritonitis. APACHE II is mainly used for critical cases in intensive care units and is not specific for perforation peritonitis.

Similarly Mannheim peritonitis index evolved for peritonitis, with 17 possible risk factors of which 8 are of prognostic relevance. Complexity of both these systems renders the Boey"s scoring system that takes into account only three variables a fairly accurate scoring system. The Jabalpur score uses six clinical factors that has been used only in peptic perforation cases. There are scoring systems / indices that have tried to predict mortality. The commonly used being APACHE II score, Simplified Acute Physiology Score (SAPS), Boey's score, Multiorgan failure (MOF) score and Mannhein Peritonitis index score (MPI). However these are not specific to peritonitis except MPI and MOF.

Table 1: Age and site wise distribution of patients.

AGE		SITE		
AGE GROUP	**PATIENTS**	**ORGAN**	**PATIENTS**	**PERCENTAGE**
1-10	06	Gastric	22	4.74%
11-20	20	Duodenum	340	73.28%
21-30	66	Jejunum	13	2.80%
31-40	85	Ileum	66	14.22%
41-50	91	Appendix	13	2.80%
51-60	110	Colon	07	1.51%
61-70	70	Rectum	03	0.65%
71-80	14			
81-90	02	Total	464	

Table 2: Number of patients and their co-morbid illness

Pre-existing illness	No. of Patients
Hypertension.	12
Myocardial Infarction.	02
Chronic Obstructive pulmonary disease (COPD)	14
Pulmonary tuberculosis	12
Diabetes	16
Liver cirrhosis	02
Renal failure	04
Immuno compromised state.	03
Malignancy	07
Total:	72

Table 3: Risk factors and their statistical significance.

Sr. No.	Risk Factors	Survivors	Non survivors	Chi-square	p-value
01.	**Sex** - Female	88 (85.44%)	15 (14.56%)	0.066	0.797
	Male	312 (86.43)	49 (13.57%)		
02.	Age	153 (78.06%)	43 (21.94%)	18.936	0.000
03.	Delay of more than 24 hours for hospitalization.	153 (82.70%)	32 (17.30%)	3.177	0.074
04.	Shock	48 (65.75%)	25 (34.25%)	30.478	0.000

05.	Operating time*	124 (82.12%)	27 (17.88%)	3.145	0.076
06.	Post-op complications	57 (71.25%)	23 (28.75%)	18.186	0.000
07.	Comorbid condition**	36 (50.00%)	36 (50.00%)	93.96	0.000
08	Colonic or rectal perforation	06 (60%)	04 (40%)	5.17	0.022

*****Minimum chi-square value.

**Maximum chi-square value.

Table 4: Binary logistic regression analysis.

Parameters ➡	B	S.E.	Wald	Df	Sig.	Exp.(B)
Age	0.507	0.411	1.521	1	0.217	1.661
PR. Delay	0.294	0.379	0.602	1	0.438	1.342
Shock	1.303	0.384	11.523	1	0.001	3.680
Adm. Op.	-0.056	0.387	0.021	1	0.886	0.946
Op. time	0.425	0.419	1.029	1	0.310	1.530
Co-morbid	1.821	0.347	27.458	1	0.000	6.175
Post-op Comp.	-0.024	0.336	0.005	1	0.944	0.977
Risk Factors	-0.034	0.242	0.019	1	0.889	0.967
Sex	0.176	0.363	0.236	1	0.627	1.192
Constant	-3.354	0.378	78.932	1	0.000	0.035

B: Regression coefficient.

S.E.: Standard Error.

Wald: Wald's coefficient.

Df: degrees of freedom.

Sig: p value.

Exp (B): odds ratio.

CONCLUSIONS

It may be concluded that merely identifying the risk factors and prognosticating the outcome based on numerical score that are currently prevalent may not be feasible in a rural setup which has its own social and economic challenges. Hence identifying the risk factor may be more beneficial in prognosticating mortality which have been statistically identified in this series.

CONFLICT OF INTEREST

None.

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REFERENCES

1. Kulkarni V S, Naik A S, Subramarrian N APACHE II Scoring system in perforative Peritonitis. Am. J. of Surg. 2007; 194(4):549 – 552.
2. Delibegovic S, Markovic D, Hodzic S APACHE II scoring system is superior in the prediction of the outcome in critically ill patients with perforative peritonitis. Med. Arch. 2011; 65(2):82 – 5
3. Notash AY, Salimi J, Rahimian H, Fesharaki MH, Abbasi A. Evaluation of MPI, MOF Score in patients with peritonitis. Ind. J. Gastroenterology 2005; 24 (5):197 – 200.
4. Kumar S, Gupta A, Choudhary S, Agarwal N. Validation of the use of POSSUM score in enteric perforation peritonitis. Pan.Aft.Med.J. 2011; 9: 22.
5. Ramkrishan K. Salinas RC.Peptic ulcer disease. Am. Fam. Physician 2007; 1: 1005 – 12.
6. Jhobta R S, Attri A K, Kaushik R, Sharma R, Jhobta. A Spectrum of perforation peritonitis in India – Review of 504, consecutive cases World J. Emerg. 2006. Surgery 1:26.
7. Agarwal N, Saha S, Shrivastava A, Chumber S, Dhar A, Garg S. Peritonitis – 10 years experience in a single surgical unit.Trop Gastroenter.2007; 28(3):117-20.
8. Gupta S, Kaushik R .Peritonitis – The eastern experience. World J. Emergency Surgery 2006; 1:3.
9. Chalya PL, Mabula JB, Koy M, MeHembe MD et al. Clinical profile & outcome of surgical treatment of perforated peptic ulcers in North Western Tanzania, A tertiary hospital experience. World J. Emerg Surg. 2011; 6:31.
10. Chatterjee H, Jagdish S, Pai D, Satish N, Jayadev D, Reddy P.S. Changing trends in outcome of typhoid ileal perforation over three decades in Pondicherry. Trop. Gastroenterology. 2001; 22: 155 – 58.
11. Chitkara N, Gupta R, Singh SL, Bansal V. Small bowel perforation. Trop Doc 2002; 32: 186.
12. Shahida P. Afridi, Faiza Malik, Shafique Ur Rahman, ShahidShamim, Khursheed A. Samo. Spectrum of perforation peritonitis in Pakistan : 300 cases Eastern experience World J. of Emerg Surgery.2008; 3:31.
13. Ahmer A. Memon, Faisal G. Siddiqui, Arshad H. Abro, Ahmed H. Agha, Shahzadi Lubana, Abdul SM. An Audit of secondary periotonitis at a tertiary case university hospital of Sindh, Pakistan World J. Emerg. Surg. 2012; 7:6.
14. Moller M,Shah k, BendixJ,Jensen A G,Zimmerman-Neilson E et al. Risk factors in patients surgically treated for peptic ulcer perforation. Scand J Gastroent.2009; 44:145-52.

15. KocerB, SurmeliS, SolacC, UnalB, BozkurtB, et al. Mortality & Morbidity in patients with peptic ulcer perforation. J Gastroenerol-Hepatol 2007; 22: 565-70.
16. KologluM, ElkarD, AltumH, Sayek I. Validation of MPI and PIA II in two different groups of patients with secondary peritonitis. Hepatogastroent. 2001; 48: 147-51.
17. KarlamanglaA, TinettiM, Guralnik J, StudenskiS, WetleT, Reuben D. Co-morbidity in older adults. Nosology ofimpairment, diseases and conditions. J Gerontol A,BioSci Med Sci 2007:62(3).296-300.
18. Ritchie C. Health Care quality and multi morbidity the jury is still out. Med care 2007; 45 (6) 477- 479.
19. Rozzini R, Frisoni G.B., Ferrncci L, Barbisoni P, Sabatini J, et al.Geriatric Index of co-morbidity. Validation and comparision with other measures of co-morbidity. Age – Ageing 2002; 31(4) 277-85.
20. Litwin MS, Greenfield S, Elkin EP, LubeckDPBroering JM, Kaplan S.H. Assessment of prognosis with total illness burden index for prostatic cancer: Aiding clinicians in treatment Choice.Cancer. 2007; 109 (9), 1777-83.
21. Lohsiviwat V, Prapasrivorakul S, LohsiriwadD. Perforated peptic ulcer – Clinical presentation, surgical outcome and accuracy of Boey's scoring system in predicting post-operative morbidity and mortality. World J. Surg. 2009; 33 (1), 80 – 5.
22. Khan S, Khan IU, Aslam S, Haque A. A prospective analysis of abdominal surgeries at Nepalgunj Medical College, Nepalgunj, Nepal – 2 years experience Kathmandu University Medical Journal 2004; 2 : 226 – 43.