



Research Article

## POST OPERATIVE EVALUATION OF COAGULATION PROFILE AS A PROGNOSTIC MARKER IN PATIENTS OPERATED FOR PERFORATION PERITONITIS

Rohit Jain<sup>1</sup>, Viplav Prashant\*<sup>2</sup> and Dnyanesh Amle<sup>3</sup>

<sup>1</sup>Department of General Surgery, Government Dental College, Raipur (CG)

<sup>2</sup>Department of Biochemistry, Government Dental College, Raipur (CG)

<sup>3</sup>Department of Biochemistry, All India Institute of Medical Sciences, Nagpur (MS)

### ARTICLE INFO

**Article History:**

Received 10<sup>th</sup> January, 2019

Received in revised form 2<sup>nd</sup>

February, 2019

Accepted 26<sup>th</sup> February, 2019

Published online 28<sup>th</sup> April, 2019

**Key words:**

Perforation peritonitis, PT/INR, Coagulation profile, Laparotomy

### ABSTRACT

**Background:** Postoperative period of laparotomy for perforation peritonitis is often complicated by liver dysfunction secondary to infection and cholestasis. Coagulopathy is generally the first indication of liver dysfunction. Thus we planned to evaluate coagulation abnormality in liver dysfunction related to postoperative period of perforation peritonitis.

**Methodology:** 100 subjects being operated for perforation peritonitis were included in the study. Coagulation profile was estimated pre operative day and on day 2 of post-operative period. The subjects were followed up till death or discharge.

**Results:** Fifth and sixth decade was commonest age group and skewed male preponderance was seen. Incidence of deranged PT/INR was 14%. Higher weight, decreased hospital stay, positive blood culture, deranged PT/INR were factors associated with death. PT/INR was found to be having significant predictive ability for mortality with 90.9 % sensitivity and 50% specificity.

**Conclusion:** Deranged PT/INR predicts bad prognostic significance in subject undergoing laparotomy for perforation peritonitis.

Copyright©2019 Rohit Jain, Viplav Prashant and Dnyanesh Amle. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

Perforation peritonitis is a frequently encountered surgical emergency in tropical countries like India, most commonly affecting young men in their prime of life. (Dorairajan LN *et al* 1995) The common age for its occurrence in Asian countries has been reported to be 45-60 years with male preponderance. (Jhobta RS *et al* 2006) and Afridi SP *et al* 2008) Contrary to as found in western countries, proximal gut perforations are more common in Indian countries. (Afridi SP *et al* 2008) Postoperative period in these subjects is often complicated by liver dysfunction secondary to infection and cholestasis. The pathophysiology of this liver dysfunction is at least partially attributed to inflammatory cytokines which may further lead to impending multiple organ failure. (Trauner Met *al* 1999) Coagulopathy is generally the first indication of liver dysfunction and must be distinguished from disseminated intravascular coagulopathy in these sick patients. Laboratory studies show severe hepatocellular necrosis with peak serum transaminase levels 10-fold or more above the upper limit of normal. Acute liver cell failure may complicate this condition. (Senzolo M *et al* 2006) Thus we planned to evaluate coagulation abnormality in liver dysfunction related to postoperative period of perforation peritonitis.

\*Corresponding author: Viplav Prashant

Department of Biochemistry, Government Dental College, Raipur, C.G

The study population of this prospective study consisted of 100 patients, both males and females, above 15 years of age, who underwent emergency surgery for gastrointestinal perforation at Dr. B.R.A.M. Hospital, Raipur. Patients who were already having deranged liver function or jaundice at the time of admission, or, those managed by drain insertion at the time of admission were excluded from the study. All 100 patients were admitted and operated consecutively during a span of one year. An informed consent was taken from the patients. The ethical clearance was obtained from the Ethical Review Board of the institution. On admission, relevant clinical history of the patients were noted, and clinical examination of patients was performed. The postoperative investigations of the patients included the baseline investigations such as haemoglobin (Hb), total and differential leucocyte counts (TLC, DLC), bleeding time (BT), clotting time (CT), PT/INR, serum proteins, blood urea, blood sugar, serum bilirubin (total and direct), serum liver enzymes, serum electrolytes and USG abdomen (if x-rays are inconclusive). Each patient was given preoperative antibiotics, preferably 2<sup>nd</sup> or 3<sup>rd</sup> generation cephalosporins, aminoglycosides and metronidazole. Anaesthesia was given, and the operative procedure was done as per standardised procedure and noted. The drugs used in anaesthesia was also noted. Patients were shifted postoperatively to intensive care unit. The postoperative course of the patients was monitored daily. PT/INR was estimated on the day of admission and post

operatively on day 2 using coagulometer as per manufacturer protocol. Data was expressed as percentage and mean ± S.D. Kolmogorove-Smirnov analysis was performed for checking linearity of the data. Student's t test was used to check the significance of difference between two parameters in parametric data. Student's t test was used to check the significance of difference between two parameters in parametric data Chi square test was used to analyze the significance of difference between frequency distribution of the data. P value <0.05 was considered as statistically significant. SPSS© for windows™ Vs 17, IBM™ Corp NY and Microsoft excel™ 2007, Microsoft® Inc USA was used perform the statistical analysis.

**Table 1** General Characteristics of study subjects

Characteristics	Frequency	Percent
<20	7	7.0
21-40	32	32.0
41-60	50	50.0
>60	11	11.0
Gender		
F	14	14.0
M	86	86.0
Analgesic	15	15.0
Gastritis	7	7.0
Asthma	4	4.0
COPD	2	2.0
Past History		
DM	7	7.0
Sickling	3	3.0
HTN	5	5.0
Tuberculosis	5	5.0
OCP	3	3.0
PT/INR		
Deranged	14	14.0
Normal	86	86.0
Blood culture		
Negative	85	85.0
Positive	15	15.0
Laparotomy findings		
EL with colostomy	3	3.0
Surgery performed		
EL with ileostomy	10	10.0
EL with RA	4	4.0
EL with repair	83	83.0
Site of perforation		
Colon	7	7.0
GD	67	67.0
SI	26	26.0
Infection		
A	53	53.0
P	47	47.0
Delay in wound healing		
A	67	67.0
P	33	33.0
Hospital stay (Weeks)		
<=1	8	8.0
2	44	44.0
3	32	32.0
>=4	16	16.0
Outcome of surgery		
Death	12	12.0
Discharge	88	88.0

**Table 2** Effect of various parameters on outcome of surgery.

Outcome	N	Mean	Std. Deviation	Std. Error Mean	t	p Value
Age (Years)	Death	12	48.4167	14.85358	4.28786	1.291 .200
	Discharge	88	42.7727	14.11670	1.50484	
Wt (kg)	Death	12	57.7500	10.46314	3.02045	2.617 .010
	Discharge	88	52.3864	6.01040	.64071	
Hospital Stay (Days)	Death	12	10.5833	11.52435	3.32679	-2.158 .033
	Discharge	88	16.1136	7.82926	.83460	

**Table 3** Association of Different Parameters with outcome

Epidemiological and laboratory parameters		Outcome		Total	Chi square	P value
		Death	Discharge			
Sex	F	1	13	14	0.364	0.472
		8.3%	14.8%	14.0%		
	M	11	75	86		
		91.7%	85.2%	86.0%		
PT/INR	Deranged	12	88	100	14.67	0.001
		6	8	14		
	Normal	6	80	86		
		50.0%	90.9%	86.0%		
Blood Culture	Negative	7	78	85	7.60	0.016
		58.3%	88.6%	85.0%		
	Positive	5	10	15		
		41.7%	11.4%	15.0%		

**Table 4** Association of surgery related parameters with outcome

Surgery related paramters		Outcome		Total	Chi square	P value
		Death	Discharge			
Surgery	EL with colostomy	0	3	3	1.116	0.583
		0.0%	3.4%	3.0%		
	EL with ileostomy	1	9	10		
		8.3%	10.2%	10.0%		
	EL with RA	0	4	4		
		0.0%	4.5%	4.0%		
Type of Perforation	EL with repair	11	72	83	0.470	0.497
		91.7%	81.8%	83.0%		
Colon		1	6	7		
		8.3%	6.8%	7.0%		
GD		7	60	67		
		58.3%	68.2%	67.0%		
SI		4	22	26		
		33.3%	25.0%	26.0%		

**Table 5** Association of post-op follow up parameters with outcome

Surgery related parameters		Outcome		Total	Chi square	P value
		Death	Discharge			
Infection	A	7	46	53	0.156	0.468
		58.3%	52.3%	53.0%		
	P	5	42	47		
		41.7%	47.7%	47.0%		
Delay in Wound Healing	A	10	57	67	0.164	0.171
		83.3%	64.8%	67.0%		
	P	2	31	33		
		16.7%	35.2%	33.0%		
Hospital stay (Weeks)	<=1	8	0	8	63.35	<0.0001
		66.7%	0.0%	8.0%		
	2	2	42	44		
		16.7%	47.7%	44.0%		
	3	0	32	32		
		0.0%	36.4%	32.0%		
	>=4	2	14	16		
		16.7%	15.9%	16.0%		

**Table 6** Prognostic significance of various variables for death in postoperative subjects with perforation peritonitis

Test Result Variable(s)	Area	Std. Error	Asymptotic 95% Confidence Interval		Sensitivity (%)	Specificity (%)	
			Lower Bound	Upper Bound			
INR	.705	.093	.022	.522	.887	90.9	50
Age (Years)	.611	.087	.213	.440	.782	60.2	66.7
Wt (kg)	.641	.099	.115	.446	.835	81.8	50

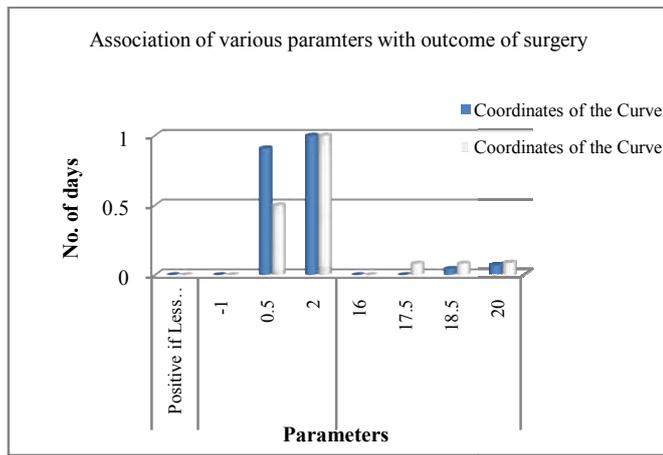


Fig 1 Association of various parameters with outcome

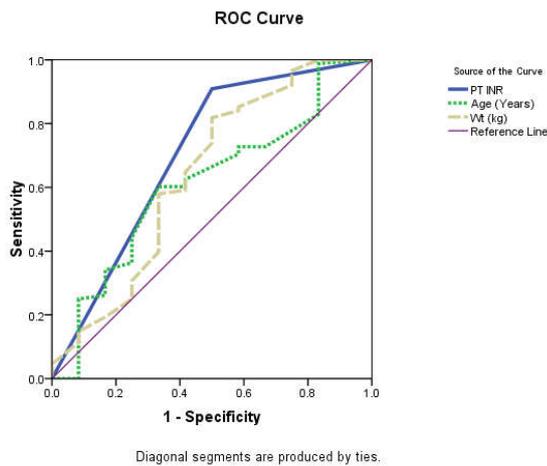


Fig 2 ROC curve for prognostic significance of various parameters.

**RESULTS**

Table 1 indicates general characteristics of study subjects. Maximum subjects were found to be in 41-60 years of age (50%) with male preponderance (86%). History of analgesic use was high in subject with perforation peritonitis so was history of gastritis and diabetes mellitus. PT/INR was found to be deranged in 14% subjects. While blood culture was found to be positive in 14 subjects.

Emergency laparotomy followed by repair was the commonest surgery to be performed. (83%) Site of perforation was found to be gastroduodenum in most subjects (67%) followed by small intestine (26%). Infection was found to be present in 47 subjects. Delay in wound healing was present in 33% subjects. Twelve subjects succumbed during the course of treatment while 88 were discharged. (Table 2)

Weight was significantly higher (p=0.01) and hospital stay was significantly less (0.033) in subjects which succumbed during the course of postoperative period. (Table 2) Significant association was noted between deranged PT/INR and death (p=0.01). Also Significant association was noted in blood culture positivity and death. (Table 3) No significant association was detected between surgery performed and type of perforation (site). (Table 4) Hospital stay was found to be significantly more in subjects who were discharged. (Table 5, Fig. 1) Prognostic significance of various variables to predict mortality was assessed. PT/INR was found to be best predictor of mortality with sensitivity of 90.09 % and specificity of 50%. (Table 6, Fig 2)

**DISCUSSION**

Gastrointestinal perforation continues to be the most common cause for exploratory laparotomy in our hospital. Prognostic factor which can predict death can help to optimize the resources and priorities the subjects presenting with perforation peritonitis. Clotting profile in term of PT/INR is one such marker which is altered by perforation peritonitis owing to effect on hepatic function. This study was planned to assess the utility of PT/INR as prognostic marker.

The incidence of perforation peritonitis was found to be maximum in subjects in 5<sup>th</sup> and 6<sup>th</sup> decade of his life. Also there was noted strong male gender propensity. The incidence of deranged PT/INR as noted in our study to be 14% which is very much comparable to the study carried out by Nishida T *et al* at Osaka police hospital in Japan where the incidence is reported to be 17%. Also the age group quoted for deranged liver function i.e. 51±10 years postoperatively matches our commonest age group. Though decreased hepatic blood flow, infections, drugs, anaesthetic agents and overwhelming inflammatory cytokines are postulated to be contributory factors, the precise cause of postoperative hepatic injury remains unelucidated. In our study history of analgesic use was found to be commonest factor associated with perforation. (Nishida T *et al* 2002)

Kriwanek S *et al*<sup>5</sup> studied the prognostic factors for survival in colonic perforation and found the poorest prognosis being associated with colorectal perforation. But in our study gastroduodenum was commonest site. (Kriwanek S *et al* 1991) Mosnier H *et al* reported the mortality rate associated with gastroduodenal perforation to be between 0% and 18%, and most studies reporting around 5-6% and associated with good prognosis which is consistent with our study. Highest incidence of perforation was found in gastroduodenal group in our study (67%) and was associated with good prognosis. (Mosnier H *et al* 1992) Hamby LS *et al* after analysing the prognostic factors in perforated gastric and duodenal ulcer found that advanced age associated with delay in diagnosis and intervention can further result in poor prognosis. But age was not found to be significantly associated with mortality in our study. Also the prognostic significance of age as seen in our study was low with sensitivity of 60.2% and specificity of 66.7% (Hamby LS *et al* 1993)

In our study deranged PT/INR was found to be significant predictor of mortality with sensitivity of 90.9%. Also deranged PT/INR was found to be significantly associated with mortality. Christou NV *et al* predicted infectious morbidity in elective operations and show that poor nutritional state is associated with high morbidity and mortality even in patients undergoing elective surgery. (Christou NV *et al* 1993) Makela J *et al*<sup>9</sup> found that surgery for patients with intra-abdominal sepsis and deranged liver function as detected by hyperbilirubinemia is accompanied by high mortality rates. (Makela J *et al* 1998) Nishida T *et al* also noted that incidence of preoperative increased total leucocyte count and decreased platelet counts was significant factors for overall mortality in postoperative period, thus indicating role of clotting profile in prediction of mortality. (Nishida T *et al* 2002)

In a prospective study conducted at NGMC Teaching Hospital, Nepalgunj, Nepal by Dr. Salamat Khan in 2004-05, 45 patients

were evaluated for postoperative liver function tests, who were operated for perforation peritonitis, and it was found that SGOT was within normal limits in 65% of cases and SGPT was within normal limits in 76% of cases whereas age adjusted alkaline phosphatase was raised in 49% of cases. In their study, mixed type of hyperbilirubinemia was seen in most of the patients (86.6% cases). (Khan S 2006) The above observation suggests that there is no damage but dysfunction of hepatocytes. Hepatocyte dysfunction is associated with altered clotting profile owing to role of liver in synthesis of clotting factors and their maturation.

Irvin *et al* also stated increased abdominal wound complications in subjects with deranged liver functions which may be additional risk factor as well as direct cause of mortality. (Irvin TT *et al* 1978)

In our study though delay in wound healing was detected in 33% subjects which is substantial number and shares varied causes, this was not associated with mortality and no direct relationship with mortality could be established. Blood culture positivity was however significantly associated with death.

Other factors which failed to establish association with mortality was gender. Though, this fact should be cautiously interpreted in light of relatively less number of female present in study. Significantly higher weight was noted in subjects with mortality. However hospital stay was found to be significantly less in subjects with death, this clearly suggests early mortality and subjects succumbing to early complications of surgery of which bleeding is one very important complication. Thus strengthening our claim of deranged PT/INR being prognostic significance of mortality in individuals undergoing laparotomy for perforation peritonitis. Thus we conclude that deranged PT/INR predicts bad prognostic significance in subject undergoing laparotomy for perforation peritonitis. Regular assessment of PT/INR must be performed in all subjects undergoing laparotomy for reformation peritonitis and all such subjects, showing deranged PT/INR must be given special attention.

**Conflict of interest:** Authors declare that there were no conflict of interest.

## References

- Aridi, S.P., Malik, F., Ur-Rahman, S., Shamim, S. and Samo, K.A., 2008. Spectrum of perforation peritonitis in Pakistan: 300 cases Eastern experience. *World Journal of Emergency Surgery*, 3(1), p.31.
- Christau. N. V., 1993. Predicting infectious morbidity in elective operations. *Am J Surg*. 165: pp52S-58S.
- Dorairajan, L.N., Gupta, S., Deo, S.V., Chumber, S. and Sharma, L.K., 1995. Peritonitis in India--a decade's experience. *Tropical gastroenterology: official journal of the Digestive Diseases Foundation*, 16(1), pp.33-38.
- Hamby, L.S., Zweng, T.N. and Strodel, W.E., 1993. Perforated gastric and duodenal ulcer: an analysis of prognostic factors. *The American surgeon*, 59(5), pp.319-23.
- Irvin TT, Vassilakis JS, Chattopadhyay DK, Greaney MG. Abdominal wound healing in jaundiced patients. *British journal of Surgery*. 1978 Jul;65(7):521-2.
- Jhobta, R.S., Attri, A.K., Kaushik, R., Sharma, R. and Jhobta, A., 2006. Spectrum of perforation peritonitis in India-review of 504 consecutive cases. *World journal of Emergency surgery*, 1(1), p.26.
- Khan, S., 2006. Evaluation of hyperbilirubinemia in acute inflammation of appendix: a prospective study of 45 cases. *Kathmandu Univ Med J*, 4(3), pp.281-289.
- Kriwanek, S., Armbruster, C., Beckerhinn. P., Dittrich, K., 1991. Prognostic factors for survival in colonic perforation. *Int J Colorect Dis* 9 pp.158-162.
- Mäkelä, J. and Kairaluoma, M.I., 1988. Relaparotomy for postoperative intra-abdominal sepsis in jaundiced patients. *British journal of surgery*, 75(12), pp.1157-1159.
- Mosnier H, Farges O, Vons C, Belghiti J, Fekete F. Gastroduodenal ulcer perforation in the patient with cirrhosis. *Surgery, gynecology & obstetrics*. 1992 Apr;174(4):297-301.
- Nishida, T., Fujita, N., Megawa, T., Nakahara, M. and Nakao, K., 2002. Postoperative hyperbilirubinemia after surgery for gastrointestinal perforation. *Surgery today*, 32(8), pp.679-684.
- Senzolo, M., Burra, P., Cholongitas, E. and Burroughs, A.K., 2006. New insights into the coagulopathy of liver disease and liver transplantation. *World journal of gastroenterology: WJG*, 12(48), p.7725.
- Trauner, M., Fickert, P. and Stauber, R.E., 1999. Inflammation-induced cholestasis. *Journal of gastroenterology and hepatology*, 14(10), pp.946-959.

### How to cite this article:

Rohit Jain, Viplav Prashant and Dnyanesh Amle (2019) 'Post Operative Evaluation of Coagulation Profile as a Prognostic Marker in Patients Operated for Perforation Peritonitis', *International Journal of Current Advanced Research*, 08(04), pp.18095-18098. DOI: <http://dx.doi.org/10.24327/ijcar.2019.18098.3451>

\*\*\*\*\*