CLINICOPATHOLOGICAL EVALUATION OF PREOPERATIVE FINDINGS AND OUTCOME OF PERFORATION PERITONITIS

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ABSTRACT

BACKGROUND

Perforation peritonitis is one of the most common emergencies encountered by surgeons all over the world. Mortality of patients with abdominal sepsis has remained as high as 20% - 60%.⁽¹⁾ There is paucity of data from India regarding its aetiology, prognostic indicators, morbidity and mortality patterns.⁽²⁾ Despite advances in surgical techniques, antimicrobial therapy and intensive care support and management of peritonitis⁽²⁾⁽³⁾ continues to be highly demanding and complex. There is a sharp contrast in the aetiological spectrum of perforation peritonitis in countries like India compared to developed countries.

Study aims to evaluate the aetiological spectrum and prognostic factors in perforation peritonitis. Mannheim's peritonitis index is significant and specific tool to predict mortality in secondary peritonitis. The study also assesses the effectiveness of MPI score to predict the outcome.

MATERIALS AND METHODS

A descriptive study conducted in 100 patients with perforation peritonitis, who underwent laparotomy in emergency department of Govt. TD Medical College, Alappuzha, for a period of 1 year duration. Outcome is assessed based on clinical, pathological and preoperative findings.

RESULTS

Of the 100 patients studied, majority were males (84%). DU perforation was the commonest cause of perforation peritonitis (40%) followed by prepyloric gastric ulcer perforation. It is comparable with Indian studies, whereas in developed world distal GI perforation predominates. Respiratory complications are the most common complication encountered (41%) followed by sepsis (39%). Delayed presentation increases mortality. Extremes of age, especially old age increases mortality. Size and site of perforation also affects outcome. Overall mortality was 16%, of which colonic and ileal perforations has maximum mortality. Comorbid conditions and associated factors (like smoking) increases mortality. Patients with MPI more than 26 has got higher mortality (33.8%) compared to patients with MPI score up to 26, clearly shows the significance of MPI.

CONCLUSION

Study helps us in earlier detection of high risk cases and to implement proper management protocols for the management of perforation peritonitis. Mortality can be reduced by risk stratification and appropriate treatment based on risk score. Peritonitis and its sequela management involves lots of skill, expensive modalities, monitoring and treatment, which has to be utilised judiciously for better patient outcome.

KEYWORDS

Gastrointestinal Tract; Secondary Peritonitis; Prognosis; Morbidity; Peptic Ulcer; Mortality; Radiology; Appendix; Sepsis.

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BACKGROUND

Peritonitis due to perforation of the gastrointestinal tract is one of the most common surgical emergencies all over the world. Morbidity and mortality of Perforation peritonitis can effectively be reduced by early diagnosis and timely intervention. Surgical management and proper perioperative

care improves the outcome. There is little role for conservative trial in perforation peritonitis nowadays. Factors like extremes of age, delayed presentation, distal GI (colonic) perforation, comorbidities, sepsis, faecal peritonitis etc. increases mortality. Careful clinical evaluation and preoperative assessment helps to stratify high risk cases to provide better care for them.

Peritonitis is a surgical emergency requiring patient resuscitation; laparotomy and peritoneal toilet; omental patch placement; and in selected patients surgery for ulcer control.⁽⁴⁾ It has been well reported that majority of the patients of perforation peritonitis present late in our subcontinent. Usually with well-established, generalised peritonitis with purulent faecal contamination and septicaemia, thus increasing the incidence of morbidity and mortality and complicating the task to provide optimal perioperative care in these patients.⁽⁴⁾ Early prognostic

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evaluation of abdominal sepsis is desirable to select high-risk patients for more aggressive therapeutic procedures and to provide objective classification of the severity of the disease, as also to choose the optimal perioperative management strategies. The perforations of proximal gastrointestinal tract were six times as common as perforations of distal GI tract, which has been noted in earlier studies from India which is in sharp contrast to studies from developed countries like United States,⁽⁵⁾ Greece and Japan which revealed that distal gastrointestinal tract perforations were more common.⁽⁶⁾ Time of presentation to the hospital, early surgical intervention and perioperative care are important factors in determining the outcome of perforation peritonitis.

The World Society of Emergency Surgery [WSES]⁽⁷⁾ has published an evidence based recommendation for management of such patients that the source of infection for the intra-abdominal sepsis should be managed at the earliest. The proposed surgical procedure depends on the anatomical site of perforation, the degree of peritoneal inflammation, the generalised septic response, the patient's underlying conditions and the available resources of the treatment centre. Early surgical intervention under the cover of broad spectrum antibiotics preceded by adequate aggressive resuscitation and correction of electrolyte imbalance are important for good outcome.⁽⁸⁾

Mortality of perforation peritonitis depends on age, sex, ulcer site, treatment delay and type of treatment. The mortality due to lower GI perforation is much higher, of which many are associated with malignancy.⁽⁹⁾ This clinical study is to evaluate the outcome of perforation peritonitis. Though the outcome depends on multiple factors, I have taken some of the important prognostic factors based on clinical and per-operative findings, which can help for early detection of high risk cases and to provide better perioperative and post-operative care for better outcome.

MATERIALS AND METHODS

Study Design

Descriptive study.

Study Setting

Surgical ward and emergency department of Govt. T.D. Medical College, Alappuzha.

Study Period

1 year duration, from January 2015 to January 2016.

Sample Size

All cases of perforation peritonitis coming to emergency department who underwent laparotomy, during the study period- 100 cases.

Study Variables

Dependent variables- Mortality and recovery independent variable- age, sex, preoperative findings and comorbidities.

Inclusion Criteria

All cases of perforation peritonitis coming to emergency department of TDMCH Alappuzha, who underwent laparotomy and have consented for participation in study.

Exclusion Criteria

- Patients under 13 years of age due to different physiological status.
- Post-operative peritonitis.

Data Collection Tool

Structured data collection proforma.

Data Collection Procedure

All patients initially examined and relevant data according to the proforma is collected, operative findings noted during surgery.

These findings were corroborated with a senior surgeon. The patient then followed up till death or discharge. Outcome studied and analysed based on per-operative findings and HPR. Mortality is defined as that which occur during the same admission for the surgery. Mortality is predicted based on MPI scoring system.

Mannheim Peritonitis Index

Mannheim Peritonitis Index Score				
Study Variable	Adverse Factor	Points	Favourable Factor	Points
Age	> 50 years	5	< 50 years	0
Sex	Female	5		0
Organ Failure	Present	7		0
Malignancy	Present	4		0
Origin of Sepsis	> 24 hrs.	4		0
Extension of Peritonitis	Non-colonic	4		0
Character of Exudate	Generalised	6		0
	Purulent	6	Clear	0
	Faecal	12		

Definition of Organ Failure⁽¹⁰⁾

- Kidney Creatinine > 2, blood urea > 50.
- Lung Po₂ < 50 mmHg.
- PCO₂ > 50 mmHg.
- Shock Systolic BP < 90 mmHg.
- GIT Paralytic ileus > 24 hrs.
- If MPI score is more than 26, there is high chance for mortality.⁽¹¹⁾

Data Analysis

Data entered into MS Excel and analysed using appropriate software. Quantitative variables summarised using mean and standard deviation.

Qualitative variables summarised in proportions and percentages.

Ethical Considerations

Study conducted only after getting approval from Institutional Ethical Committee. A written informed consent is taken from all the patients included in the study. The patients participating in the study shall not have to incur any expenses.

RESULTS

Observation and Analysis

Sex	Number	%
Male	84	84
Female	16	16
Total	100	100

Table 1. Sex Distribution

Graph 1. Sex distribution

In my study, 84% were males and 16% were females.

Sex	Recovered	%	Death	%
Male (84)	72	85.7%	12	14.3%
Female (16)	12	75%	4	25%

Table 2. Sex and Outcome

Of the 16 females, 4 expired (25% mortality) which shows that mortality rate is more in female in our study, which is favourably comparable with other published studies.

Graph 2. Sex and Outcome

Sex and Outcome

Site of Perforation	Number	%
Ileum	18	18
Appendix	15	15
Gastric (pre-pyloric)	23	23
Unknown	3	3
Colon	1	1
DU	40	40
Total	100	100

Table 3. Site of Perforation

Graph 3. Site of perforation

Perforations were grouped into 6 aetiologies. Duodenal perforation is the commonest cause of perforation peritonitis (40%), second is prepyloric gastric ulcer perforation (23%), ileal perforation (18%), appendicular perforation (15%). One case of colonic perforation and in 3% cases cause is unknown.

Age	Number	%
Less than 20	4	4
20 - 29	15	15
30 - 39	32	32
40 - 49	12	12
50 - 59	16	16
60 and above	21	21
Total	100	100

Table 4. Age Distribution

Graph 4. Age distribution

Age varied from 15 yrs. to 70 yrs., youngest was 15 yrs. with traumatic ileal perforation and oldest was 70 yrs. old with duodenal perforation. Mean age is 40.78 and standard deviation is 14.84.

Time of Presentation	Number	%
1 day or less	29	29
2 - 3 days	55	55
> 3 days	16	16
Total	100	100

Table 5. Time of Presentation (Days)

Graph 5. Time of presentation (days)

After onset of symptoms, patients presented to us within 6 hours to 6 days.

Mean Time of presentation 2.27 days and standard deviation is 1.12.

Size of Perforation	No.	%
Up to 1 x 1	77	77%
> 1 x 1	23	23%
Total	100	100%

Table 6. Size of Perforation

Graph 6. Size of perforation

Mean size of perforation is 1.29 cm and standard deviation is .518

Complications	Number
Sepsis	39
Burst abdomen	2
Hypotension	17
Respiratory complications	41
Bile leak	1
Faecal fistula	2

Table 7. Complications

Graph 7. Complications

Respiratory complications (41%) are the commonest complication in my study. Sepsis (39%) was the second most one.

Outcome	Number	%
Recovered	84	84
Death	16	16
Total	100	100

Table 8. Outcome

Graph 8. Outcome

Overall mortality in my study is 16%, which is favourably comparable with other published studies.

Age	Recovered	%	Death	%
< 20 (4)	4	100%	-	-
20 - 39 (47)	46	98%	1	2%
40 - 59 (28)	20	71.5	8	28.5%
60 or more (21)	15	71.5	6	28.5%

Table 9. Age Group and Outcome

Mean age of patients who died is 55.62 and SD is 9.12 and mean age of patient who recovered is 37.95 and SD is 14.04. Statistical test is 't' test and p value is < 0.001, which shows mortality increases with age.

Graph 9. Age group and outcome

Age Group and Outcome

Site of Perforation	Recovered	%	Death	%
Ileum (18)	13	72.2%	5	27.8%
Appendix (15)	15	100%	-	-
Gastric (23)	22	95.7%	1	4.3%
DU (40)	34	65%	6	15%
Colon (1)	-	-	1	100%
Unknown (3)	-	-	3	100%

Table 10. Site of Perforation and Outcome

Statistical test is chi-square and p value is < 0.001, which shows site of perforation affects outcome. Overall mortality was 16%, of which one colonic perforation and three cases with unknown cause. In the study, colonic perforation and unknown cases have 100% mortality followed by Ileal perforation 27.8%, Duodenal perforation: 15%, Gastric perforation: 4.3%, Appendicular perforation: 0%.

Graph 10. Site of perforation and outcome

Site of Perforation and Outcome

SOP (cm)	Recovered	%	Death	%
Up to 1 x 1 (77)	71	92%	8	8%
> 1 x 1 (23)	15	65%	8	35%

Table 11. Size of Perforation and Outcome

Statistical test is 't' test and p value is 0.001 implies size of perforation influence outcome.

Graph 11. Size of perforation and outcome

Size of Perforation and Outcome

TOP (Days)	Recovered	%	Death	%
1 day or less (29)	29	100%	-	-
2 - 3 (55)	49	89%	6	11%
> 3 (16)	6	37.5%	10	62.5%

Table 12. Time of Presentation and Outcome

Statistical test is 't' test and p value is < 0.001 implies mortality increases with delayed presentation.

Graph 12. Time of presentation and outcome

Time of Presentation and Outcome

Associated Factors	Recovered	%	Death	%
Present (46)	35	76%	11	23.9%
Absent (54)	49	90.7%	5	9.3%

Table 13. Associated Factors and Outcome

Statistical test applied is chi-square test and p-value is 0.046, which shows that associated factors like smoking, alcoholism, acid peptic disease and NSAID use increase mortality.

Graph 13. Associated factors and outcome

Associated Factors and Outcome

Comorbid Conditions	Recovered	%	Death	%
Present (25)	15	60%	10	40%
Absent (75)	69	92%	6	8.1%

Table 14. Comorbid Conditions and Outcome

Statistical test is chi-square test and p-value 0.001, which shows that comorbid conditions like diabetes, hypertension, COPD and renal failure increase mortality.

Graph 14. Comorbid conditions and outcome

Comorbid Conditions and Outcome

MPI	Recovered	%	Death	%
26 or less (74)	72	97.3%	2	2.7%
> 26 (26)	12	46.2%	14	33.8%

Table 15. MPI and Outcome

Statistical test applied is chi-square test and p value is < 0.001, which shows that mortality is higher in patients with Mannheim peritonitis index more than 26.

MPI and Outcome

Graph 15. MPI and Outcome

Chest X-Ray Erect showing Pneumoperitoneum

Prepyloric Gastric Ulcer Perforation

DISCUSSION

Perforation peritonitis is a frequently encountered surgical emergency in tropical countries like India, most affecting younger men in prime of life as compared to the studies in the West where it is becoming more frequent among old people.⁽¹²⁾ In majority of cases, presentation to the hospital is late with well-established generalised peritonitis with purulent or faecal contamination and varying degrees of septicaemia. The signs and symptoms are typical and it is possible to make a clinical diagnosis of peritonitis in all patients.

The perforations of proximal gastrointestinal tract were six times as common as perforations of distal gastrointestinal tract as has been noted in earlier studies from India.⁽¹³⁾ The perforations of the proximal gastrointestinal tract are the commonest sites in my study, which is comparable with earlier studies in India but in Western world distal GI tract perforations predominate.⁽¹⁴⁾ In my study, there is an increasing trend of prepyloric gastric ulcer perforation. Duodenal to gastric ulcer ratio was 7:1 as per the recent study series in India as against 15:1 noted in earlier studies,⁽¹³⁾ which requires further research in future.

There were 16 deaths which is comparable with other published series.⁽¹⁵⁾ Peritoneal contamination is the crucial consideration in patients with peritonitis and problem of mortality is a problem of infection. So by early intervention we succeed in preventing further contamination by removing the source of infection, though the end result also depends on the general host resistance and the antibiotic sensitivity of the organism.⁽¹⁶⁾

Major causes of post-operative morbidity were respiratory complications (like pneumonia, atelectasis, pleural effusion, ARDS) and sepsis, which are preventable and should be detected early and aggressively treated. In this study mortality is significantly associated with age of patients, time of presentation, site of perforation, size of perforation, associated comorbid factors like DM, HTN, COPD, etc. Mannheim Peritonitis Index also has got significant association with mortality. Boey et al (1982) have identified 3 main risk factors as-⁽¹⁷⁾

- Concurrent medical illness like cardiorespiratory disease, renal failure, DM, hepatic precoma.
- Pre-operative shock.
- Perforation more than 24 hours.

Most of the patients presented late with mean time of presentation 2.27 days.

This is because of lack of awareness and delay in diagnosis in situations like ileal perforation in typhoid fever.⁽¹⁸⁾ So the contamination is more, which leads to post-operative mortality due to septicaemia and morbidity like wound sepsis. Similar study conducted by Homay Vajidfar and Rajiv Singh at Lady Hardinge Medical College and Shrimati Sucheta Kriplani Hospital, all the 15 patients who died had symptoms for more than three days (6.4 days).⁽¹⁹⁾

Size of perforation affects outcome in my study. Mortality was higher (35%) for patients with large perforation (> 1 cm). Similar study conducted at Mayo Hospital, Lahore showed size of the largest perforation > 0.5 cm increases mortality.⁽¹⁸⁾ In this study, no mortality was found in appendicular perforation. Since the number of cases of colonic perforation are few, long-term studies are needed to assess the mortality and complications arising therein.

MPI is an important and specific tool to assess mortality in perforation peritonitis. It is easy and reliable. The results of our study corresponding to the study of billing et al in trend.⁽²⁰⁾ Patients with MPI score more than 26 has got higher mortality, which is comparable with other studies.⁽²¹⁾

In short outcome of perforation peritonitis depends on multiple factors, some are known and others unknown, which is to be kept in mind while treating patients with perforation peritonitis and should be managed accordingly. Pre-operative and per-operative evaluation and MPI scoring are important predictors of mortality in perforation peritonitis.

CONCLUSION

- The descriptive study was done on 100 patients in TDMC Alappuzha from January 2015 to January 2016.
- Various factors affecting mortality in peritonitis patients were studied.
- Studying the prognostic factors and outcome will definitely help us in earlier detection of high risk cases and to implement proper management protocols to reduce morbidity and mortality.
- Duodenal ulcer perforation was the commonest cause of perforation peritonitis.
- There is an increasing trend in prepyloric gastric perforation, which should be evaluated in detail.
- The increasing incidence of hollow viscus injuries due to blunt abdominal trauma is a diagnostic dilemma for the surgeons and warrants early recognition and prompt treatment to avoid major morbidity and mortality.
- Extremes of age, especially elderly patients have higher mortality.
- The impact of sex on outcome could not be conclusively proved, even though female patients seem to have poorer prognosis.
- Type and extent of peritoneal contamination seem to have a bearing on mortality.
- Patients with diffuse peritonitis and faecal contamination do worse.
- There is a wide scope for use of Mannheim Peritonitis Index.
 - Determine the risk of patient preoperatively.
 - Surgical decision- definitive/damage control surgery.
 - Patients with high score need to be managed in well-equipped surgical ICU with well-trained personnel and facilities.
- Cases of peritonitis carry a high mortality which can be reduced by early diagnosis, risk stratification, appropriate treatment based on risk score.
- Delayed presentation, which has important effect on mortality is beyond our control; only adequate health education, proper referral mechanism can reduce this.
- Peritonitis and its sequelae management involves lots of skill, expensive modalities, monitoring and treatment which has to be utilised judiciously based on risk stratification.

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REFERENCES

- [1] Anderson ID, Fearon KC, Grant IS. Laparotomy for abdominal sepsis in the critically ill. *Br J Surg* 1996;83(4):535-9.
- [2] Bali RS, Verma S, Agarwal PN, et al. Perforation peritonitis and the developing world. *Int Sch Res Not* 2014;2014:4.
- [3] Ramakrishnan K, Salinas RC. Peptic ulcer disease. *Am Fam Physician* 2007;76(7):1005-12.
- [4] Sule AZ, Kidmas AT, Awani K, et al. Gastrointestinal perforation following blunt abdominal trauma. *East Afr Med J* 2007;84(9):429-33.
- [5] Vani DK, Prasad DR. A clinical study of perforation peritonitis. *Int J Sci Res* 2015;4(8).
- [6] Sharma L, Gupta S, Soin AS, et al. Generalized peritonitis in India--the tropical spectrum. *Jpn J Surg* 1991;21(3):272-7.
- [7] World society of emergency surgery: studies and statistics 2016. Available from: <https://www.wses.org.uk/>
- [8] Khan PS, Dar LA, Hayat H. Predictors of mortality and morbidity in peritonitis in a developing country. *Turk J Surgery Ulusal Cerrahi Derg* 2013;29(3):124-30.
- [9] Bielecki K, Kamiński P, Klukowski M. Large bowel perforation: morbidity and mortality. *Tech Coloproctology* 2002;6(3):177-82.
- [10] Multiple organ dysfunction syndrome in sepsis: background, pathophysiology, epidemiology 2016. Available from: <http://emedicine.medscape.com/article/169640-overview>.
- [11] Predictive power of mannheim peritonitis index 2016. Available from: http://www.academia.edu/11433320/Predictive_Power_of_Mannheim_Peritonitis_Index.
- [12] Uccheddu A, Floris G, Altana ML, et al. Surgery for perforated peptic ulcer in the elderly. Evaluation of factors influencing prognosis. *Hepatogastroenterology* 2003;50(54):1956-8.
- [13] Dorairajan LN, Gupta S, Deo SV, et al. Peritonitis in India--a decade's experience. *Trop Gastroenterol* 1995;16(1):33-8.
- [14] Jhobta RS, Attri AK, Kaushik R, et al. Spectrum of perforation peritonitis in India-review of 504 consecutive cases. *World J Emerg Surg* 2006;1:26.
- [15] Crawford E, Ellis H. Generalised peritonitis--the changing spectrum. A report of 100 consecutive cases. *Br J Clin Pract* 1985;39(5):177-8, 184.
- [16] Small-Bowel perforations 2016. Available from: <http://jamanetwork.com/journals/jamasurgery/article-abstract/587029>.
- [17] Jae-Myung K, Sang-Ho J, Young-Joon L, et al. Analysis of risk factors for postoperative morbidity in perforated peptic ulcer. *J Gastric Cancer* 2012;12(1):26-35.
- [18] Ileal perforation due to typhoid fever-review of operative management and outcome in an urban centre in Nigeria. *International Journal of Surgery* 2016. Available from: <http://www.journal-surgery.net/article/S1743-91911300030-7>.
- [19] Singh R, Kumar N, Bhattacharya A, et al. Preoperative predictors of mortality in adult patients with perforation peritonitis. *Indian J Crit Care Med* 2011;15(3):157-63.
- [20] Hamza AA. Evaluation of the predictive value of Mannheim peritonitis index in Omdurman teaching hospital. *ResearchGate* 2015.
- [21] Nomani AZ, Malik AK, Qureshi MS. A new prognostic scoring system for perforation peritonitis secondary to duodenal ulcers. *JPMA J Pak Med Assoc* 2014;64(1):50-6.