



STUDY OF TRAUMATIC PERFORATION PERITONITIS WITH IDENTIFICATION OF RISK FACTORS

General Surgery

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ABSTRACT

Background: Traumatic accidents are on the rise in developing countries like India. Abdominal trauma form an important cause of mortality. This study aims to identify the causes of mortality in traumatic gastrointestinal perforations.

Material and Methods : One hundred and two cases of perforation peritonitis due to trauma are analysed. The type of trauma, age of the patient, time duration between trauma and hospitalization, presence of shock on admission, associated pre-existing illness, site of perforation and its treatment, and postoperative complications were noted. The risk factors to mortality were evaluated using chi-square test and p-value.

Results : The incidence of trauma was more in males and in younger age group of 21 to 40 years. Seventy one patients had blunt and thirty one had penetrating trauma. Ileal perforation was the most common i.e. 48 cases followed by jejunal 29, colonic 10, gastric 8, duodenal 5 and rectum 2. Twelve patients out of 22 above of fifty succumbed; six patients expired out of eleven patients who had delayed admission. Eight patients had preexisting illness out of which six expired. Ten patients expired out of eighteen who were admitted in shock.

Presence of pelvic or spine fractures increased the mortality as three out of five patients expired. Nine out of eleven patients expired who had post operative complications. However, the mortality did not depend upon the type of trauma blunt or sharp.

Conclusion : The statistical analysis showed that age more than 50 years, pre-existing illness, delayed hospitalization, shock on admission, associated pelvic or spine injury and post-operative complications are the predominant risk factors for mortality.

KEYWORDS

Gastrointestinal Perforation, Peritonitis

INTRODUCTION:

In a developing country like India a lot of development is taking place particularly in rural parts of India in the form of concrete roads and multilane highways. The wide roads and multilane highways have definitely contributed to increased vehicle speed exceeding the speed limits. This has resulted in an increase in vehicular accidents. In addition frustration amongst the unemployed youth has resulted in increased violence and stabbing incidences. However, it is also necessary to analyse the factors which to mortality in these cases. This increase in incidences of vehicular accidents along with increased criminal tendencies has lead to increase in the incidence of such injuries. Abdominal trauma is a major component of these injuries. To add to this, lack of adequate medical facilities and poor socioeconomic status contribute to the morbidity.

In many cases delay in getting proper treatment leads to complications and mortality. This study aims to analyse the various factors and cofactors that have a bearing on the mortality of patients with traumatic peritonitis alongwith a review of literature.

MATERIALS & METHODS:

Present study was conducted in Department of General Surgery, VMMC and Safdarjung Hospital, New Delhi from April 2018 to March 2019. One hundred and two cases of peritonitis due to trauma are included in this study. The trauma cases which did not have gastrointestinal perforation are excluded. The patients with major head injuries were excluded. The patients were assessed for vitals and the emergency treatment was initiated in the casualty itself and then in intensive care area. The cause and nature of trauma were noted. After clinical assessment, the relevant blood investigations and radiological investigations including sonography were done.

Eight patients had pre-existing medical illness. Four patient had chronic renal failure (two of them had diabetes), two patients had hypertension, one had right bundle branch block and one patient was known case of HIV infection. All the patients underwent laparotomy.

Eight patients had perforation of stomach, five duodenal perforation, twenty nine jejunal, forty eight Ileal, ten colonic and two rectal.

The isolated bowel injuries were noted in 54 patients inclusive of 2 colonic and 2 rectal. The colonic and rectal perforations were closed with proximal colostomy and in rest of the patients simple closure of perforation was done. Thirteen patients (including three of colon) required resection of the involved segment due to two or more perforations or trauma to the mesentery of the segment. Thirty five patients having bowel perforation required additional procedure. Five of them underwent splenectomy, two liver suturing, one hysterectomy, one suprapubic cystostomy and others reduction of fractured limbs.

All the data like age of the patient, type of trauma (blunt / penetrating), time duration between trauma and surgical intervention, presence or absence of hypotension, pre-existing illness if any, organ injured and procedure done, post operative complications were analysed in relation to mortality. The risk factors were evaluated by using chi-square and p-values for their statistical significance.

OBSERVATIONS:

In this study 102 consecutive cases of perforation peritonitis due to trauma are analysed. The incidence of trauma was more in younger age group i.e. 21 to 30 and 31 to 40. Out of 102 cases 90 were male and 12 were female with M:F ratio being 7.5:1, indicating a male predominance in trauma. The mean age for male was 36.3 years and female was 39.8 years (Table 1). Traumatic gastrointestinal perforation may be due to blunt or penetrating (sharp) injuries.

Table 1 : The age and sex wise incidence of trauma

Age in years	Male	Female	Total
1-10	06	-	06
11-20	08	03	11
21-30	28	03	31
31-40*	19	01	20
41-50	11	01	12
51-60	11	02	13
61-70	03	02	05
71-80	04	-	04
Above 80	-	-	-
Total	90	12	102

*Maximum patients in these age group.

Seventy one patients sustained blunt and thirty one patients penetrating trauma. Thirty three patients (46.4%) of blunt trauma were because of road traffic accidents. Fifteen were due to fall from height (more than 15 feet), eight had fall of a heavy object on the body. Six patients had assault (kicks and fights), two patients were dragged in machine and in seven the cause was not specified. Out of 31 patients of penetrating trauma 21 (67.74%) were due to stab by knife, eight cases were due to bullgore injury in farmers and two were due to gunshot.

Ileal perforation was observed in 48 patients, followed by jejunal 29, colonic 10, gastric 8, duodenal 5 and rectum 2. Perforation of a single

organ was seen in 71 and 31 patients had other visceral trauma in addition to perforation. Ninety one (89.2%) patients were admitted within two hours after trauma and eleven (10.8%) were admitted after twelve hours. Seven out of these delayed admissions expired. In this study 18 patients were admitted in hypotension (Systolic blood pressure [BP] below 90 mmHg). Ten out of these eighteen patients expired.

Eight patients had pre-existing medical illness. Four patients had chronic renal failure (two of them had diabetes), two patients had hypertension, one had right bundle branch block and one patient was known case of Human immunodeficiency virus (HIV) infection. Six patients expired out of these eight. Many of the patients especially of blunt trauma had additional injuries (Table 2).

Table -2 Associated injuries in addition to gastrointestinal perforation

Injury	Abdominal Viscera*						Chest**	Fractures***				
	Spleen	Liver	Kidney	Pancreas	Urinary Bladder	Uterus		Lower	Upper	Pelvis	Spine	Head injury
Blunt	4	2	2	1	1	-	6	5	3	3	2	3
Sharp	1	-	-	-	-	1	3	-	1	1	-	-
Total	5	2	2	1	1	1	9	5	4	4	2	3

*Twelve cases of Abdominal trauma, **Nine cases of chest injury, ***Bony injuries

Five patients had splenic rupture, two liver lacerations, two renal injury, one each of urinary bladder and uterus. Extra-abdominal injury was noted in 27 patients. Nine patients had pneumothorax and were treated with intercostal drainage. Five patients had lower limb fractures and four had upper limb fractures. In all these cases, fractures were reduced and splint was given. The definitive surgery was carried out for fractures afterwards. Four cases of fracture pelvis and two cases of lumbar spine fracture were treated conservatively. Three cases had only cerebral concussion and did not require surgical intervention. The surgical procedures were decided upon the findings of laparotomy (Table 3). For perforation either simple closure or resection of the involved segment was done. For any associated injuries to liver, spleen etc. addition procedure was carried out. Twenty one patients developed surgical wound infection, two of them developed burst abdomen. Two patients required re-exploration, one for faecal fistula and other for pelvic abscess. Seven patients developed respiratory complications, two of them bronchopneumonia, one aspiration pneumonia, three acute respiratory distress syndrome (ARDS) and one pulmonary embolism. Four patients developed renal failure.

Table-3 Mortality related to operative procedure

Type of Injury	Stomach		Duodenum		Jejunum		Ileum		Colon		Rectum		Total		Total
	Sur.	Exp**	Sur.	Exp.	Sur.	Exp.	Sur.	Exp.	Sur.	Exp.	Sur.	Exp.	Sur.	Exp.	
Closure or Resection	3	-	3	-	17	2	29	6	4	1	1	1	57	10	67
Additional Procedure	3	2	1	1	7	3	11	2	3	2	-	-	25	10	35
Total	82	20	102												

*Sur. = Survived, **Exp. = Expired

The risk factors for mortality & their significance were evaluated (Table 4).

It is obvious that, age above 50 years, presence of shock on admission and post operative complications were highly significant risk factors.

Delay of more than 8 hours after trauma, associated pre-existing illness and fracture of limb/spine/pelvis were significant risk factors.

However, the type of trauma (blunt or sharp) and any additional surgical procedure than the closure of perforation were not of statistical significance in this study.

Table-4 Risk factors considered for mortality and their significance

Age	Survivors	Non-survivors	Chi-square	P-value	
Age					
Age below 50	70(87.5%)	10(12.5%)	11.88	0.000056	Highly Significant
Age above 50	12(55.55%)	10(45.45%)			
Shock					
Present	8(44.45%)	10(55.55%)	17.91	0.000023	Highly Significant
Absent	74(88.10%)	10(11.90%)			
Delay					
Delay	5(45.46%)	6(54.54%)	9.547	0.002	Significant
No Delay	77(84.62%)	14(15.38%)			
Co-morbid factors					
Present	2(25%)	6(75%)	16.89	0.0014	Significant
Absent	80(85.11%)	14(14.89%)			
Closure/Addition					
Closure	57(85.08%)	10(14.92%)	2.71	0.00741	Significant
Addition	25(71.43%)	10(28.57%)			
Limb#/Pelvic or Spine#					
Limb#	13(92.86%)	1(7.14%)	4.82	0.0281	Significant
Pelvic or Spine#	3(50%)	5(50%)			

Post-op complications

Present	2(18.19%)	9(81.81%)	30.2	0.0001	Significant
Absent	80(87.92%)	11(12.08%)			

Blunt/Sharp

Blunt	54	17	2.78	0.0954	Not Significant
Sharp	28	3			

DISCUSSION :

The surgeons are aware that the abdomen is a magic box. One can expect the findings full of surprises especially when dealing with blunt abdominal trauma. It has been observed in this series that blunt trauma to the abdomen is caused much more frequently than penetrating trauma. The most common cause being road traffic accidents followed by fall from height. The same observation is reported by Chirdan. The blunt trauma injury is due to either by compression or deceleration. In compression there is transient increase in the intra-luminal pressure leading to perforation. The site of perforation is usually the junction of mobile and fixed segment of the bowel i.e. proximal jejunum near the ligament of tritz or terminal ileum near ileo-caecal junction. In this series also the incidence of ileal perforation was more followed by jejunal, colonic, stomach & duodenum. However in another series the incidence of jejunal and ileal perforation was almost same.

Sometimes bowel injury is also associated with mesenteric injury.

The cases of blunt trauma may be associated with injuries to other solid viscera like liver, spleen, pancreas or kidney. There may be associated fractures of limbs. The fractures of pelvis and lower spine may be associated with urinary bladder injury and extensive retroperitoneal trauma. Severe craniocerebral and chest injury lead to higher mortality. The cause of penetrating injury was mainly stab by knife.

The incidence of stabbing in this area is due to domestic rivalry, fights for land and family problems.

The other cause was bullgore injury in farmers. This in contrast with other series where more penetrating injuries were due to gunshot. Trauma is observed more in males than female and in younger age group.

The victims of trauma are usually brought to the hospital early and the history itself is indicative of the cause. In this study 89.2% patients were admitted within two hours of injury. The mortality is higher if patient is brought to the hospital late. The mortality is more if the patient is admitted in hypotension (Blood pressure less than 90 mmHg Systolic). In this series mortality was 55.5%, in such patients indicating hypotension is major risk factor. All the patients of abdominal trauma need proper physical evaluation and specialised investigations apart from routine investigations. Three most important investigations recommended are diagnostic peritoneal lavage (DPL), abdominal sonography and computerized tomography (C.T.) with or without contrast. There is a lot of debate about the utility of these investigations. DPL has been replaced by C.T. studies as DPL may lead to negative laparotomies and its results are not consistent.

Sensitivity of X-ray erect abdomen in hollow viscus perforation is 50 to 70%. In pregnant woman & children sonography may be preferred to X-ray or C.T. Sonography is useful mainly for injuries to solid viscera but definite opinion is not possible for hollow viscus perforation and mesenteric injuries. The major advantage of C.T. is that it is not only capable of revealing the presence of intra-abdominal injuries but can identify the organ involved. A multi detector C.T. imaging can accurately detect bowel & mesenteric injuries. The mesenteric injuries can be detected by abrupt termination of the contrast in the mesenteric vessels or by detecting contrast extravasation in the mesenteric vessels. Despite recent advances in imaging modalities like CT with or without contrast (which is the usually method of choice) diagnosis and interpretation of results remain difficult.

All the trauma patients require proper monitoring and early decision about the line of treatment particularly the decision about the exploratory laparotomy. In haemodynamically stable and alert patients where hollow viscus injury is not anticipated, laparotomy is not indicated and the patient can be monitored with repeated physical examinations. Laparoscopy may be considered as another modality of diagnosis in cases of doubtful injury. However in a haemodynamically unstable patient laparotomy should be done without delay. In a country like India, particularly in rural hospitals where C.T. scan facilities may not be available or even if available expert opinion of the radiologist may not be available it is always better to do an exploratory laparotomy.

For hollow viscus perforation the choice of surgical procedure is simple closure. If there are multiple perforations in a small segment then a resection and anastomosis is the procedure of choice. In cases of mesenteric injury where there is ischaemia of the affected segment of the bowel resection is the treatment of choice. For colonic perforations the decision of closure with or without colostomy requires proper consideration. The major post-operative complications may be intra-abdominal bleeding due to slipping of ligature to the vascular pedicle, fistula formation at the site of anastomosis or opening of sutured perforation. The mortality is higher in patients who develop respiratory complications like bronchopneumonia, adult respiratory distress syndrome and pulmonary embolism.

Risk factors leading to Mortality:-

It is observed that the overall mortality in this series was 19.60%. Blunt trauma had a higher incidence of mortality as compared to penetrating injury. There is a difference of opinion regarding the risk factors. Some authors are of the opinion that mortality does not depend on age, pelvic fractures, thoracic trauma but mortality increases with associated cranio-cerebral trauma. The mortality is higher in elderly age group, blood loss more than 1500 ml, extra abdominal injury and delay more than 5 hours for initiating the treatment. A delay in intervention by more than 8 hours increased the mortality. Extra-abdominal injuries increase the mortality in paediatric age group. Female sex, long interval between abdominal injury and surgery, shock on admission and cranial injury are significant risk factors.

A study also suggests that elderly age group, chest injury, intra-abdominal solid organ injury, low glasgow coma scale (GCS) & low revised trauma score are other risk factors.

It is observed in this series that age above 50 years, delay in hospitalisation, presence of shock on admission, associated pre-existing illness, additional injury to spine or pelvis and postoperative complications are responsible risk factors for mortality.

CONCLUSION:

Age more than 50 years, pre-existing illness, delayed hospitalization, shock on admission, associated pelvic or spine injury and post-operative complications are the predominant risk factors for mortality.

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