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Research Article

A CLINICAL STUDY OF HAEMOPERITONEUM AND ITS MANAGEMENT

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A R T I C L E I N F O

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Hemoperitoneum, Shock, Perforation, Hemoglobin, Hematuria, Hemothorax, Paracentesis, Hypochondrium.

A B S T R A C T

Introduction: To study in detail haemoperitoneum& its management. It is the presence of blood in the peritoneal cavity.therefore early diagnosis is utmost important to minimize unnecessary death & complication.
Objective: To study various etiologies, variations in early diagnosis, surgical management, morbidity and mortality associated with cases of hemoperitoneum
Materials and Methods: It is cross sectional prospective study.Patients were studied from December 2015 to may 2017, total number of patients were 42 admitted in our tertiary centre in a state of shock.
Results: In our study, the results werehighly significant with p value<0.05, with incidence more in the age group 21- 30 years more in males with road traffic accident, the commonest mode of injury. Liver and splenic injuries were the commonest cause presenting with pain and vomiting. Patient had guarding and tenderness.
Conclusion: During this study of haemoperitoneum due to abdominal trauma, and other causes we have been able to formulate a profile of its etiology, clinical picture and causes of mortality

INTRODUCTION

Hemoperitoneum, Shock, Perforation, Hemoglobin, Hematuria, Hemothorax, Paracentesis, Hypochondrium.

METHODS

The source of data is collected in a specially designed case recording proforma from the patients and the informant (in case the patient is unconscious or disoriented) and by doing detailed clinical examination and relevant investigations.

STUDY POPULATION

The patients were studied from admission up to discharge or death from December 2015 to may 2017. A total of 42 patients were admitted in our tertiary centre with haemoperitoneum. Patients were admitted in a stage of shock & required immediate resuscitation. Cases will be included according to the definition of haemoperitoneum as illustrated in the "Sabiston text book of surgery".A negative four quadrant paracentesis patient with a positive Ultrasonography/ Computed All age group patients of both sexes.Tomography Scan (abdomen/pelvis) report cases excluded were already diagnosed and conserved cases of haemoperitoneum which may be referred to our hospital for further management.

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DISCUSSION

Approximately 10% of civilian injuries that require operation are the result ofabdominal trauma[2,3].Haemoperitoneum occurs as a result of abrupt shearing forces leading to tear of organs or vascular pedicles.[4,5] Unrecognized injury to intra-abdominal contents remains a distressingly frequent cause of preventable death[6,7,8].

Sex Distribution

In our series of 42 patients, there were 34 males and 8 females.

	Series	Male : Female Ratio
1.	Present Series	4.25: 1
2.	Madhumita Mukhopadhyay[9]	8.4:1
3.	Subedar Singh[10]	9:1
4.	Nikhil Mehta[11]	3.73:1

In the present series the youngest patient was 3 years old and the oldest one was 76 years old.

Series	Age group	Percentage
1. Present series	11-40	54.7%
2. Surendra K Kala[12]	11-40	70.91%
3. Subedar Singh[10]	11-40	72%
4. Mousami Singh[13]	11-40	70%

Thus we can say that majority of abdominal injuries occur in the age group of 11-40 years, as this population is exposed more to causative factors of abdominal trauma.Road traffic accidents accounted for 83.3% of our patients.11.9% of our

patients had injury due to fall from height.4.7% of our patients had assault injury.

Cause of abdominal Trauma	Percentage of Patients		
	Present Series	Surendra K Kala[12]	Subedar Singh[10]
RTA	83.3%	72.72%	54.2%
Fall from height	11.9%	10%	20%
Assault	4.7%	16.36%	16%
Other Injuries	0	0.9%	8%

Thus road traffic accidents are the commonest cause of haemoperitoneum.In our series 38% patients were admitted with shock (i.ebp=<90/60 mmhg) and the remaining 62% without shock.

Series	With Shock	Without Shock
Present Series	38%	62%
Subedar Singh[10]	22%	78%
Nikhil Mehta[11]	34%	66%

The four components of an accurate, early diagnosis were a detailed history, repeated and thorough clinical examination, high index of suspicion and abdominal fur quadrant tap with ultrasonography for confirmation and in some cases CT Scan. In our series there were three patients in the age group of 1-10 years out of which two presented with shock, monitored closely, laparotomised and found having haemoperitoneum due to liver laceration and splenic injury respectively.Distension of abdomen was found in 21 patients. Abdominal guarding was present in 30 patients while rigidity was marked in 10 patients.On percussion obliteration of liver dullness was present in 4 patients. In two patients with jejunal perforation and mesenteric tear liver dullness was not obliterated. Thus absence of this sign does not exclude perforation.Peristalsis was absent in 10 patients.Head injury, chest injury, limb fractures and fracture ribs were the commonly associated injuries. Diagnostic aids are,haemoglobin percentage is one of the most important laboratory investigation available in evaluation of the patient with abdominal trauma[14],blood transfusion whenever necessary for resuscitation,urine examination to rule out microscopic hematuria,blood sugar level tocheck DM,blood urea & creatinine to know renal function, xray abdomen erect for Free intraperitoneal air (intestinal perforation) Ground glass appearance, Multiple gas and fluid levels, Increased radiodensity in right or left hypochondrium.X-Ray Chest in erect position looked forFree intraperitoneal air (intestinal perforation) Fracture ribs, Pneumothorax,Haemothorax ,Injury to diaphragm. X-Ray for associated injuries to skull, pelvis, spine and long bones were taken as and when indicated.In the present series four quadrant paracentesis was done in 42 cases. It was true positive in 36 cases. Hence the accuracy of four quadrant paracentesis was 85.7%.It can be practiced in any rural area where facilities for diagnostic radiology are not available.

Series	Percentage of positive result
Present series	85.7%
Jogindar Singh et. al.[14]	95%
T.Narasanga Rao et. al.[15]	100%

From this we can conclude that four quadrant abdominal paracentesis has a definite role in the diagnosis of abdominal trauma and haemoperitoneum.The introduction of diagnostic peritoneal lavage in 1965 provided a safe and inexpensive method to rapidly identify life-threatening injuries.

The limitations of this diagnostic modality lies on its timely completion, availability of experienced radiologists, equipment variability, patient cooperation, necessity for oral and intravenous contrast enhancement agents and costs. Early studies comparing CT scan with DPL demonstrated that CT scan is more specific than DPL; several injuries were missed by DPL but detected by CT scan. In our series USG abdomen was carried out in 42 cases out of which 34 hadIntraperitoneal collection of blood i.e. showed 80.9% positive findings of these 11 patients were having liver injuries, 16 patients were having splenic injuries and 7 patients were having free fluid collection either due to mesenteric tear or bowel perforation.Until the recent introduction of video-assisted laparoscopy, diagnostic peritoneal Lavage (DPL) and computed axial tomography (CT scan) were the main diagnostic tools available to the trauma surgeon.

Pre-Operative Treatment:This consists of two parts, Resuscitation of the patient&Routine treatment.Resuscitation began on admission for patients in shocki.eMaintenance of Patent Airway ,Restoration of Plasma Volume,Oxygen Therapy, Position of Patient, Keeping The body warm. Conservative line of treatment was Nil by mouth, IV. Fluids,Ryles tube aspiration,IV Antibiotics.Criteria for doing an exploratory laparotomy arePneumoperitoneum, Positive abdominal tap, Progressive hypotension and tachycardia ,Progressive pallor, Signs of peritonitis.Exploratory laparotomy or surgical intervention is carried out as and when required.In cases of abdominal trauma there is considerable doubt as to the extent and location of the organ(s) or viscera injured. This unknown quality makes it necessary for us to use that incision which will allow the surgeon a thorough exploration of the abdominal cavity and help the surgeon to carry out any surgical procedure which is then required. Here, for this series of 42 patients with haemoperitoneum laparotomy was carried out in 31 patients while the remaining 11 patients were treated conservatively. Type of the incision was decided according to the involvement of the organ, so that exploration time was minimal and direct approach to the injured organ was easy. Whenever grossCollection was seen in the peritoneal cavity, on USG abdomen, a midline vertical incision was taken. This was done because both splenic as well as hepatic injuries could be simultaneously dealt within the same incision.In the present series 42 patients with haemoperitoneum hepatic injury occurred in 11 patients (26.19%) of these 1 patient had Grade I injury, 5 patients were having Grade II injuries, 4 patients had Grade III injuries and 1 patient had Grade IV injury.

Series	Incidence of an Hepatic Injury
Present Series	26.19%
Subedar Singh series[10]	26.69%
Madhumita Mukhopadhyay[9]	30.7%
Cox E F Series[16,17]	35.6%
Nikhil Mehta[11]	35%
Surendra K Kala	38.18%

In the present series out of 11 patients of hepatic trauma one patient died because of hemorrhagic shock.The first priority is to resuscitate the patient. Pringle's Maneuver[8] (temporary occlusion of the portahepatis) and tight liver packing are

critical maneuvers to attenuate blood loss. We employed dependant drainage for every case of liver injury. Tube drains were used. In our series of 42 patients of haemoperitoneum there were 19 patients with splenic trauma i.e. 45.23%.

Series	Percentage of splenic injury
Present Series	45.23%
Surendra K Kala[12]	36.36%
Subedar Singh Series[10]	28.57%
Nikhil Mehta[11]	53%
Mousami Singh[13]	30.91%

In the present study of 42 consecutive cases of haemoperitoneum having 19 cases of splenic injury 11 patients were operated and 8 patients were conservatively managed. 2 patients died of hemorrhagic shock.In 1952, King and Shumacker[44] had reported on the increasing incidents of post splenectorny infection such as meningitis or septicemia. They found out about the OPSI Syndrome i.e. overwhelming post splenectomy infections, characterized by sudden sepsis,massive bacteremia (usually pneumococcal) followed by early death. Therefore, splenorrhaphy and autotransplantation have been tried where the aim is at conserving the spleen. Pneuomoccal vaccination in splenectomy patients is a must to prevent pneumoccal sepsis. Along with that H.Influenza vaccine and Meningococcal vaccine is used to prevent sepsis.We used tube drain for drainage of the splenic bed. We did not have subpherenic collections or drain tract infection due to our drains, as is reported by many western authors In the present series of 42 cases of haemoperitoneum there were 8 cases of mesenteric tear and mesocolon tear.

Series	Percentage of patients
Present series	19.04%
Nikhil Mehta series[11]	11%
Rodkey series[18]	5%
Cox E F series[16,17]	13%

In this series 7 cases of small bowel perforations were found. Out of which 5 perforations were closed and in 2 cases of ileal perforation resection anastomosis was done

Series	Percent of patients with small bowel injury
Present series	16.6%
Surendra K Kala series[12]	13.65%
Massachusetts series	18%
Nikhil Mehta series[11]	17%

In the present study there were 2 (4.7%) patients with injury to stomachGastric perforation was closed in two layers.

Series	Percentage of injury to stomach
Present series	4.7%
Subedarsingh series[10]	13.3%
Surendra K Kala[12]	1.81%
Massachusetts series	2.4%
Nikhil Mehta series[11]	1%
Mousami Singh series[13]	9.1%

In the present series of 42 patients with haemoperitoneum 4 patients expired giving the mortality rate of 9.52%.

Series	Percentage of mortality
Present series	9.52%
Massachusetts series	7.2%
Subedar Singh series[10]	20%
Nikhil Mehta series[11]	4%
MadhumitaMukhopadhyay series[12]	6.8%
Surendra K Kala series[12]	9%

In ours series of 42 patients, 14 patients had post-operative complications indicating there by a 33.3 percent incidence of complications 9 patients had wound infection, 1had respiratory tract infection, 3 had septicemia and 1 had adhesive obstruction. Out of 3 patients with septicaemia 2 patients expired leading to 66.67% percent mortality in septicaemic patients. Infection of the wound in the form of collection of pus or wound dehiscence occurred in 9 patients but there was no mortality in this group. There were three patients of haemoperitoneum who needed secondary suturing.Any form of trauma either to the abdomen or other parts increased the physical and mental stress and strain on the patient. The sudden impact is not tolerated by many patients. In such patients emergency surgery always had higher chances of post operative complications. The route of entry is either through blood, trachea or urine. So also, preoperative resuscitation of the patient possibly introduced infection which also caused post operative septicemia, in some patients of shock .Care was therefore taken during insertion of CV line, catheterization of the bladder, tracheostomy, abdominal paracentesis etc. During the operation, contamination of abdominal cavity was avoided by isolation techniques using sponges. A thorough peritoneal toilet was given wherever indicated.During the post operative period, prolonged intravenous infusions and non-ambulation of the patient does a lot of damage. An lntravenous set should be changed every 24 hours. Intramuscular and intravenous injections should be given by sterile disposable needles which was possible in our hospital. These factors led to prevention of further infection. As respiratory infections were quite common, benzoin steam inhalation and vigorous chest physiotherapy was given.Wound infections were managed by sending pus for culture and sensitivity and starting appropriate antibiotics. Hospital Infections (nosocomial) have increased in the last 20 years. In our series, infection of the wound due to pseudomonas was predominant. Intravenous Metronidazole was given in all patients with badly contaminated peritoneal cavity. All abdominal drains were removed as soon as their purpose was served because they could have served as routes of infections if they were kept for a longer time. Abdominal binders or corsets were used in all debilitated and elderly patients with bad wounds to prevent burst abdomen.In patients with septicaemia, blood culture, serum electrolytes, blood urea nitrogen levels were monitored everyday to maintain electrolyte balance. Cephalosporins of the third generation had a useful application in septicemia patients.There were no gastric fistulas or pneumococcal infections seen in our patients.Sakikowaet al[7] had noted a variety of post splenectomy complications such as meningitis and intra abdominal abscess formation. But in our series, We had 3 patients of post splenectonomy fever, which subsided after the infections were treated with proper antibiotics. All our patients were given prophylactic pneumococcal vaccine, H. influenza vaccine and Meningococcal vaccine.

H. influenza vaccine and Meningococcal vaccine.

OBSERVATION AND RESULTS

Table No.1 Sex distribution

Sex	No.	Percentage (%)
Male	34	80.95%
Female	8	19.05%
Total	42	

In the present study, 34(80.95%) patients were male and 8 (19.05%) were female**.**The male to female ratio was 4.25:

Table No 2 Age and Sex distribution

Age in years	Male	Female	Total	Percentage (%)
<10	3	0	3	7.12%
10-20	5	1	6	14.28%
20-30	8	1	9	21.42%
30-40	5	3	8	19.04%
40-50	3	2	5	11.90%
50-60	4	1	5	11.90%
60-70	4	0	4	9.52%
>70	2	0	2	4.76%
Total	34	8	42	
Mean ± SD	36.06 ± 12.09	37.00 ± 13.17	36.23 ± 12.97	

Amongst the patients admitted during the study the maximum incidence of haemoperitoneum 21.42% was noted in the age group of 20-30 years. In the present series the youngest patient was 3 years old and the oldest one was 76 years old.The highest incidence is seen in male population in the age group of 20-30 years.

Table No.3 Mode of Injury

Mode	No. of cases	Percentage (%)
RTA	35	83.33%
Fall	5	11.90%

By applying Z test of difference between two sample proportions the proportion of mode of injury road traffic accidents (RTA) is more significant than other mode of injuries ($p<0.05$).The commonest cause of haemoperitoneum in our series is road traffic accident- 83.33% followed by fall-11.90% and then by assault- 4.77%.

Table No 4 Type of Injury and Age

Age in years	Type of injury			
	Total patients	RTA	FALL	ASSAULT
<10	3	1	2	0
10-20	6	6	0	0
20-30	9	9	0	0
30-40	8	6	0	2
40-50	5	5	0	0
50-60	5	4	1	0
60-70	4	2	2	0
>70	2	2	0	0
Total	42	35 (83.34%)	5 (11.90%)	2 (4.76%)

Value of $\chi^2 = 27.020$, $p=0.0191$, significant.By applying Chi-square test there is a significant association between age and type of injury. In the age group of 10-40 years 23 cases of haemoperitoneum were recorded of which 21 cases were due to road traffic accidents and 2 due to assault.Highest incidence of road traffic accidents was seen in the age group of 20-30 years.

Table No.5 Symptoms

Symptoms	No. of cases	Percentage (%)
Pain	42	100
Vomiting	31	73.81%
Distension	12	28.57%
Giddiness	11	26.19%
Pain alone	2	4.76%
Pain+ Vomiting	19	45.23%
Pain+ Vomiting+ Distension	10	23.82%
Pain+Vomiting+ Distension+Giddiness	2	4.76%

In our study all 42 patients presented with pain in abdomen, 31 patients had vomiting, 12 patients had abdominal distension and 11 patients had giddiness.By applying Z test of difference between two sample proportions the proportion of symptoms Pain and Vomiting is more significant than other symptoms ($p<0.05$).

Table No.6 Signs

Signs	No. of cases	Percentage (%)
Tenderness	42	100%
Guarding	30	71.42%
Rigidity	10	23.81%
Absent Peristalsis	10	23.81%
Tenderness alone	1	2.38%
Tenderness+ Guarding	25	59.53%
Tenderness+ Guarding+ Absent Peristalsis	5	11.91%
Tenderness+ Rigidity	6	14.28%
Tenderness+ Rigidity+ Absent Peristalsis	4	9.52%
Tenderness+ Absent Peristalsis	1	2.38%
Total	**42**	

In this study, all patients had tenderness; guarding was present in 30 patients, followed by rigidity in 10 patients. Peristalsis was absent in 10 patients.By applying Z test of difference between two sample proportions the proportion of signs Tenderness and Guarding is more significant than other signs ($p<0.05$).

Table No.7 Distribution of Pulse, Systolic blood pressure, Diastolic blood pressure and Hemoglobin (Hb%)

	Mean ± SD
Pulse (Beats per min)	99.67±15.19 per minute
Systolic blood pressure	95.67±13.15 mmhg
Diastolic blood pressure	62.49±12.43 mmhg
Hb%	9.90±1.65 gm%

The mean pulse recorded in 42 patients in our study was 99.67±15.19 beats per minute.The mean blood pressure in 42 patients in our study was 95.67±13.15/62.49±12.43mmHg.The mean Haemoglobin percentage in our patients was 9.90±1.65

Table No.8 Presence or Absence of Shock

State	No. Of Patients	Percentage
With Shock	16	38%
Without Shock	26	62%
Total	42	

In our study of 42 patients with haemoperitoneum, 38% of patients presented with hypovolemic shock whereas 62% of patients did not have shock

Table No.9 Delay in Hospitalization and mortality

Time delay in hours	Total patients	Deaths	Percentage (%)
<6 hours	31	0	0
6-24 hours	9	3	33.34%
>24hours	2	1	50%

CONCLUSIONS

During this study of haemoperitoneum due to abdominal trauma, and other causes we have been able to formulate a profile of its etiology, clinical picture and causes of mortality . This has helped us to provide better clinical diagnostic and management criteria to reduce the high mortality of this dreaded condition.The commonest cause of haemoperitoneum, was splenic rupture. The mortality was due to severe hemorrhagic shock in 57% of the expired patients in our study. We would like to stress that repeated and detailed examinations in patients of abdominal trauma supplemented by a four quadrant abdominal tap and USG is a must to provide an early diagnosis.The facilities like CT Scan can be used on emergency basis in cases of a negative abdominal paracentesis for diagnosis of haemoperitoneum.Though there has been a changing trend towards a more conservative approach, this can only be safely undertaken if repeated and urgent sophisticated investigations are available and is well supported by clinical examination and laboratory aids. We thus feel that careful clinical evaluation ,four quadrant abdominal tap, emergency USG abdomen followed by an early laparotomy in a haemodynamically "unstable" patients is still the treatment of choice for haemoperitoneum.We have found that the time delay in admission of our patients alone in itself is not an accurate parameter of mortality as severity of trauma, the organ injured and number of associated injuries are factors on which also depends the mortality of the patients. Although less the time delay in admission, the quicker the resuscitation measures can be initiated, thus improving overall survival chances. The only way to reduce the mortality of haemoperitoneum for the surgeon is to maintain a high degree of suspicion and make quick decisive judgments before taking the patient on the operation table. Thus, time is of essence for those borderline patients for whom life stands in the balance.

LIST OF ABBREVIATIONS

RTA	**Road traffic accident**
CT	**Computerised tomography**
DM	**Diabetes mellitus**
DPL	**Diagnostic peritoneal lavage**
USG	**Ultrasonography**
IV	**Intravenous**
CV	**Central venous**

DECLARATION

Ethics approval and consent to participate: Ethical approval has been given by the" Krishna Institute Of medical Sciences" Deemed To be university, Karad, Maharashtra, India where the study was conducted. Patients participated in the study after giving their written informed consent**.**

Consent for publication: Authors and patients participated in the study give their consent to publish this article**.**

Availabilty of data and material: These were made available by our university and patient's inflow to our hospital.

Competing interest: The authors declare that they have no competing interest.

Authors' contributions: Both the authors contributed to the manuscript concept, surgery, literature retrieve, and writing. They took part in the surgeries, patient data collection, manuscript drafting and writing. Both the authors took part in the statistical analysis of this study. Both the authors have read and approved the manuscript.

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Authors' information: This is included after the heading in the beginnining.

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