

Evaluation of the Management of Penetrating Abdominal Injuries - Lahore General Hospital Experience

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Objectives To study the changing pattern of penetrating abdominal injury, to check the effectiveness of management, to audit the associated morbidity and mortality and to suggest ways and means to improve serious outcome. **Study Design:** Prospective interventional. **Place and Duration of study:** Department of surgery Lahore General Hospital, Lahore from March 1998 – to March 2004. **Subject/Method:** Exploratory laparotomy of all patients with history of penetrating abdominal injury with at least breach of peritoneum. **Results:** In all 420 patient exploratory laparotomy was performed their average pulse rate was 110 / min, systolic blood pressure 90 / mm Hg with Hb range of 5.5 gm / dl to 11.5 g / dl. There were 68% victim of firearm injury and 32% were suffered from stab on exploration virtually no organ found to escape injury while 42 (10%) cases turned out to be negative with uneventful postoperative recovery. 94(24.2%) patients developed post operative complications while 42(10%) patients expired. **Conclusion:** Time should not be wasted in investigating unstable patients rather these should be resuscitated in Operation Theater and early exploratory laparotomy should be performed more sophisticated diagnostic facilities like ultrasound, CT, MRI, Endoscopy, selective angiography should be made available in emergency and there should be regular audit of all penetrating abdominal injuries.

Key words: Penetrating abdominal injuries

Trauma is the principal public health problem in most countries and it is the fourth commonest cause of death in all ages and the most frequent cause of death in less than 45 year age group¹. A sizable chunk of trauma comprise of penetrating abdominal injuries. Which has increased tremendously during the past few years.

The diagnosis and management of abdominal injuries is sometimes difficult for the surgical team working in emergency, resulting in serious outcome. Diagnosis is frequently delayed because of associated injuries that tend to mask the presence and severity of abdominal injury. In penetrating abdominal injuries multiple organ systems are usually involved. The plight of the seriously injured patient depend upon immediate and specific treatment offered. Early recognition of intra abdominal injury is the single most important factor effecting ultimate morbidity and mortality. There was a need to study the changing pattern of penetrating abdominal injuries, the way these patients are currently managed, effectiveness of management as reflected by associated morbidity and mortality and to suggest ways and means to improve the serious outcome.

Material and Methods:

All patients with penetrating abdominal injuries managed by one of the three surgical units of Lahore General Hospital Lahore in six year starting from March 1998 to March 2004 were included in this study.

Inclusion Criteria: The patients presented in casualty department with, history of penetrating injury to abdomen, history of penetrating injury to the chest with signs of peritoneal irritation, history of penetrating injury involving buttocks with signs of peritoneal irritation, haematuria, haematemesis or haematochezia (Bleeding per rectum) following penetrating injury were included.

Exclusion Criteria: The patients with suspected penetrating injuries not found to have peritoneal breach on tractotomy and who expired during the resuscitation process were excluded.

Protocol of Management and Laparotomy: The patients were received in the emergency where the injuries were assessed and immediate resuscitative measures adopted. The resuscitative measures involved provision of venous excess and infusion of crystalloids like ringers lactate, 0.9% isotonic saline, Colloids e.g. gelafundin and haemaccel were also used. Fresh blood was preferred over stored blood. Nasogastric tube and folley's catheter was passed and appropriate antibiotics started. Apart from routine investigations like Hb% and blood for grouping & cross matching plain radiographs of abdomen, chest and other regions were taken in all except extremely serious patients requiring urgent surgical intervention. Intravenous pyelography was performed where urinary tract injury was suspected. Ultrasonography was also used wherever it deemed necessary in otherwise haemodynamically stable patients but with signs of peritoneal irritation. More advanced diagnostic facility like C.T scan despite of its availability was not used in any case for initial diagnosis but its help was taken postoperatively for intra abdominal collection. Chest intubation under local anesthesia was performed through the 4th to 6th intercostal space to decompress the chest and improve respiration when indicated. After all above measures exploratory laparotomy was decided. Indications of emergency laparotomy are given in table I. The abdomen was opened under GA & ETI by midline incision, blood was evacuated. Immediate control of hemorrhage was achieved with packing or ligature. Different organ injuries were managed according to their merits with standard techniques. Peritoneal irrigation was done with 0.9%

normal saline. Subphrenic, prae-colic paraduodenal spaces and pelvic cavity were drained where indicated. The closure of abdomen was performed in layers or enmass. Skin and subcutaneous areas were left open in some cases with gross contamination.

Results

During the study period of six years 420 patients of penetrating abdominal injuries were admitted for management. The age & sex distribution is shown table 2. The mean age was 28 years ranging from 13 – 70 years 94% patients came from within a radius of 100 kilometers from the hospital and out of these 68% were firearm victims and (32%) were injured by other sharp weapons like knives, icepacks, iron bar or other pointed objects as shown in figure 1. In (78%) patients there was strong evidence of homicidal attempts. 20% patients were accidentally involved in cross fires. There were 9(2%) attempts at suicide three with stab and six with firearm. In all 420 patients mean pulse rate was 110/min. Their average systolic blood pressure was 90 mm Hg, 80% patients had tender abdomen. Bowel sounds were absent in (60%) patients. 202 (48%) patients had associated extra abdominal injuries as shown in table 3. The hemoglobin value ranged from 5.5 gm/dl to 11.5 g/dl. Free gas under diaphragm was observed in 105(25%) patients. Hemopneumothorax was present in 35(8%) cases in 84(20%) patients foreign body (bullet) was visible on plain radiograph 50(12%) patients had inconclusive radiological picture, in 13 patients i.v.u did not outline kidney on the injured side. Thirteen patients were exempted from radiological investigation due to their serious condition. Figure 2. Emergency ultrasound was helpful in 50% of doubtful cases. All the cases were explored by laparotomy and injury to the abdominal contents was demonstrated in 378(90%) cases. Details of these injuries are shown in table 4. In 42(10%) cases no intraperitoneal injury was found and these patients had smooth recovery. Ninety four patients (24.2%) had post operative complications as shown in table 5.

Majority of these cases were infective in nature and were managed with appropriate antibiotics, repeated dressing of wound needle aspiration of abscesses and debridement in cases of retroperitoneal slough. 18(4%) cases of burst abdomen were managed with application of retention suture. While 10 cases of fecal fistulae were managed conservatively with successful outcome. The overall survival rate was 378(90%) while 42(10%) patients expired (Table6).

Table 1: Indications for laparotomy

Evisceration
Continuous intraperitoneal haemorrhage as evident by deteriorating condition of the patient
Peritonism
Haemetemesis, haematuria, haematochezia
Peritoneal breach on tractotomy

Table 2: Age and sex distribution

Age in year	n=	Male	Female
13-20	34	30	4
21-30	138	118	20
31-40	112	102	10
41-50	36	30	6
51-60	60	58	2
61-70	28	27	1
>70	12	12	-
Total	420	377	43

Table 3: Incidence of associated extra abdominal injuries

Injuries	n =	%age
Limb Fractures	122	60.39
Chest trauma	30	14.85
Spinal cord injury	25	12.37
Head injury	25	12.37
Total:	202	100

Table 4. Details of abdominal injuries and their management

Viscera	n =	Management
Stomach	42	Primary repair
Small bowel	250	Primary repair, duodenum 12, ileum 175, jejunum 63.
Colon	102	Right hemicolectomy 32, exteriorization 40, primary repair with diverting colostomy 20, primary repair without colostomy 10.
Rectum	30	Primary repair with diverting colostomy 15, Hartmann's procedure 15.
Liver	55	Hepatorrhaphy 35, fmgre fracture technique and intrahepatic ligation 8, segmental resection 5, peripatic packing 7
Diaphragm	25	Primary repair
Spleen	30	Splenectomy 22, splenorrhaphy 8.
Urinary bladder	25	Repair
Pancreas	15	Repair in nine cases, distal pancreatectomy in three cases, whipple's operation in three cases where it was combined with duodenum injury.
Kidney	20	Nephrectomy in thirteen cases, repair of kidneys in seven cases.
Ureter	15	Repair over a stent.
Vessels	60	Ligation in 46 cases of mesenteric vascular injury, Repair of abdominal aorta in 4 cases. Repair of inferior vena cava in 5 cases. Repair of external iliac artery in 3 cases Unilateral ligation of internal iliac artery in 2 cases.

Table 5: Postoperative Complications

Septicaemia due to peritonitis	15
Subphemic abscess	18
Wound dehiscence	18
Empyema thoracic	3
Wound infection	16
Retroperitoneal sepsis	6
Pelvic abscess	4
Interloop abscess	4
Faecal fistulae	10
Total	94

Table 6: Causes of death (n=42)

Intraoperative deaths : 18	
Primary brain damage	6
Excanguination / coagulopathy	12
Postoperative deaths : 24	
Refractory shock	5
Septicaemia/peritonitis	12
Chest complications	7

Figure 1

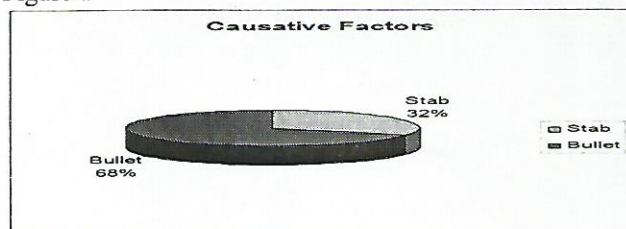
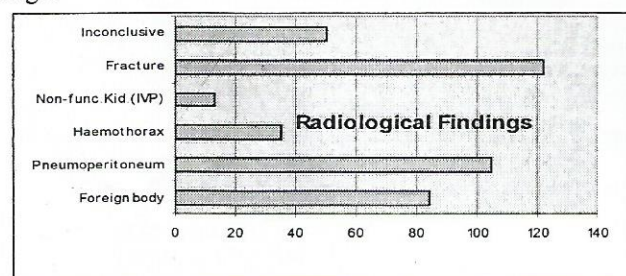


Fig.2



Discussion

The diagnosis and management of intra abdominal injuries is one of the most challenging areas in emergency surgery². An effective and organized approach coupled with a high index of suspicion and an awareness of the consequences of missed injuries are necessary ingredients in the successful management in these difficult cases³. A selective approach regarding exploratory laparotomy is now advocated by many authors^{4,5,6}. Particularly for stab abdomen to avoid unacceptably high rate (upto 40%) of their negative laparotomies⁷. We explored every case of penetration of abdomen either due to gunshot or stab where peritoneum was breached as Dr. Abul Fazal Ali⁸ also recommended similar approach. Because where clinical and available diagnostic studies are unable to resolve the issue, laparotomy is often more prudent than expectant observation⁹. We took the help of investigations like diagnostic peritoneal lavage (DPL), ultrasound, contrast x-rays whenever there was difficulty in making diagnosis. More sophisticated tests like endoscopy, selective angiography and laparoscopy were not used because these services are not available in emergency hours, so we cannot comment on the application of these tests for penetrating abdominal injuries, but we never met across the situation when these could have helped us or change our management plan. In comparison to other indications of laparotomy we found clinical examination to be more reliable indicator of organ injury discovered at operation. On exploration it was found that very few organs escaped the damage. The pattern of injury depends upon the size and depth of the organ and offending agent. The frequency of small gut, liver and colon injuries can thus be explained on these bases. All the intra peritoneal injuries were managed in standard manner using different techniques depending upon the grade of organ injury, combination of organ injury and condition of the patient.

A high rate of infection (20%) as observed in our study can be attributed to less strict control on asepsis in our emergency operation theater and with higher incidence of bowel injury. Since the wound sepsis was prevalent in injuries of the gut, the delay in laparotomy must also have had a significant bearing on the subsequent development of this complication. We found interrupted suturing technique, for abdominal closure in all contaminated cases gave satisfactory results. Ten cases of enteric fistulae which developed in this study were of colonic injury associated with other abdominal organ injuries all of them were managed non operatively with successful results so the enteric fistulae can be prevented by careful operative technique.

Effectiveness of our management as reflected by high morbidity and mortality rates is no match to the reported outcome in western hospitals. Their regimes are influenced by the availability of multidisciplinary teams, state of art investigative facilities including ultrasonography, laparoscopy, CT Scan, MRI, selective angiography, availability of safe blood transfusion and access to I.C.U. If we want to improve our results we will have to upgrade our facilities and use them effectively. The two major causes of deaths in this study were exsanguination associated with coagulopathy and respiratory failure, former because of poor blood transfusion services and later because of non availability of ventilatory support.

Conclusion

Pallor and shock is the commonest clinical finding in the victims of penetrating abdominal injury so time should not be wasted in investigation in haemodynamically unstable patients. Instead they should be resuscitated in operation theater and early exploratory laparotomy should be performed. Facilities for diagnostic procedure like ultrasound, CT Scan, selective angiography and laparoscopy should be made available in trauma centre. There should be a regular audit of all penetrating abdominal injuries to device/update our management protocol.

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