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RESEARCH ARTICLE

PENETRATING ABDOMINAL INJURY IN TERTIARY HOSPITAL: OUR EXPERIENCE

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ABSTRACT

Penetrating Abdominal trauma is increasing because of the increase of violence in our fellowship. A number of patients with penetrating abdominal trauma have normal vital signs and negative abdominal examination when referred to trauma centres. A great heap of contention exists between authorities about screening these patients for emergency laparotomy. The optimal management of hemodynamically stable asymptomatic patients remains controversial. The goal is to identify and treat injuries in a cost efficient way. Common evaluation strategies are Local Wound Exploration (LWE), Diagnostic Peritoneal Lavage (DPL), Serial Clinical Assessments, and Computed Tomography (CT) imaging. Reaching a decision to operate on a patient with penetrating injury abdomen is a challenge. The Objective of this study was to analyze the pattern of penetrating abdominal trauma, current management practiced and outcome.

Patients and Methods: Eighty (80) patients who were admitted to the Department of General Surgery, Bowring and Lady Curzon Hospital between March 2010 and August 2015 with abdominal stab wounds were included in prospective study.

Results: A total of 80 patients with penetrating abdominal trauma were assessed with a mean age of 29 yrs. The male to female ratio was 25.7:1. Most of the patients (89.4%) were in the Second to fourth decades of their liveliness. Twenty-Five patients (31.25%) presented with shock. The homicidal Stab wound is the commonest mode of injury seen in our patients. All of our patients were managed by exploratory laparotomy. Hollow viscus injuries were reported in 81.25% and Solid organ injuries was found in 20% of the patients. The rate of negative laparotomy of this study was 7.2%. Complications and mortality were encountered in 31.25% and 2.5% respectively. The mean hospital stay was 9 days.

Conclusion: The study shows no difference in the pattern of intra-abdominal injuries regardless of the means of penetrating abdominal injury. The rate of operative treatment is satisfactory, but laparotomies can be avoided in hemodynamically stable patients without peritonitis provided more sensitive investigations are available which can identify early/minor injuries. There is a need to identify new imaging modality/ procedure which helps to determine the management scheme. Till date many investigations / procedures have been proposed, but none have withstood the test of time. The overall outcome was acceptable and comparable to other studies.

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INTRODUCTION

Trauma is still the most frequent cause of morbidity and mortality in the first four decades of life globally, regardless of the degree of socioeconomic development (Aldemir *et al.,* 2004).

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The most vulnerable organs of the abdominal cavity to penetrating abdominal trauma are the small intestine and colon respectively (Saghafinia *et al.,* 2010). All patients who are hemodynamically unstable after penetrating abdominal trauma are managed surgically with urgent exploratory laparotomy. However, controversy exists regarding the appropriate management of hemodynamically stable patients. Modalities such as local wound exploration (LWE), Diagnostic peritoneal lavage, serial clinical assessments and computer tomography (CT) scans have been used to evaluate the need for therapeutic

intervention and laparotomy (Mitra, 2009). In an Australasian survey both general and trauma surgeons felt that peritonitis and hemodynamic instability warrant laparotomy while most of the surgeons felt that local wound exploration by an experienced surgeon was most useful in assessing penetrating abdominal trauma. A valid indication for laparotomy was thought to be a rift in the fascial layer seen on exploration of the wound (Cameron and Civil, 1998). The purpose of this retrospective study was to document patterns of penetrating abdominal trauma, current management practiced and outcome of the patients treated operatively.

Patients and methods

This prospective clinical study was done in the Bowring and Lady Curzon Hospital between March 2010 and August 2015. Only surgically treated 80 patients were included in this study and analyzed. Indication of urgent laparotomy in our centre was patients with visceral evisceration, peritonitis or hemodynamic instability after a penetrating injury to the abdomen, in other patients LWE were first done. If the peritoneum was penetrated urgent laparotomy was performed. Children below 10 years of age and patients with retroperitoneal and KUB injury were excluded. Medical records of all patients were reviewed. All patients had either unstable hemodynamic or signs of abdominal injuries requiring operation. Clinical data regarding patient demographics, haemoglobin levels, white blood cell counts on admission, mechanism of injury, hemodynamic status on presentation, Abdominal Ultrasonography, operative procedures, coexisting abdominal and extra abdominal injuries, number of blood transfusions, the result in terms of morbidity and mortality was taken in. Coexisting extra-abdominal injuries were divided broadly into cranial injury, chest injury (including rib fracture, hemothorax or pneumothorax, lung and cardiac), musculoskeletal system injuries (including long bone fracture) and retroperitoneal hematoma (including pelvic fracture and great vessel injury). All patients were divided into two main groups according to current Advanced Trauma Life Support (ATLS) protocols based on the hemodynamic status at presentation: stable and unstable (American College of Surgeons Committee on Trauma, 1997). Hemodynamic instability were defined as systolic blood pressure less than 90 mmHg and pulse rate higher than 100 beats per minute at the time of presentation in our hospital.

RESULTS

This prospective study included 80 patients. The age of patients ranging from 12 to 67yrs. Penetrating abdominal injuries (PAIs) were common in the Second to Fourth decades of life 71 (89.25%). The age group 21 - 30 years was the most involved representing 37 (46.25%) cases (Table 1). Males were predominant 77(96.25%) whereas females were only 3 (3.75%) making a male to female ratio of 25.7:1. Twenty Five patients (31.25%) presented in a state of shock and 20 (25%) with features of peritonitis. Evisceration through the stab wound was observed in 25 (31.25%) of the patients. In majority of them evisceration of omentum 16 (20%) was present. Imaging was done in 55 (68.75%) of the patients. Abdominal Ultrasonography showed haemoperitoneum in all cases and Solid Organ Injury in 10 (18.18%) cases. X-ray Erect abdomen and Chest radiograph showed air under diaphragm in 29 (52.72%) cases. Local exploration of the wound was done in all 80 (100%) cases, breaches in peritoneum was present in all cases. All patients received prophylactic injectable antibiotic before surgery and antibiotics were continued for 7-10 days postoperatively. Splenectomised patients were given Pneumococcal vaccine within 24hrs of surgery followed by Meningococcal and Hib vaccines after 2 weeks. Chest trauma was present in 3 (3.75%) cases and treated accordingly.

Intra-Operative Findings and Procedures Performed

All patients were managed by exploratory laparotomy 80 (100%). Table 3 shows the frequency of individual organ damage in the study. Hollow viscus injuries (stomach, small and large bowel) occurred in 81.25%, while solid organ injuries (liver, spleen) in 20%. Small bowel injuries were seen in 32 (40%), 12 (37.5%) patients ended with resection and anastomosis due to multiple injuries. While in large bowel trauma 25 (31.25%), colostomies were fashioned in 5 (20%) cases. Splenic injuries were reported in 10 (12.5%) and splenectomy was carried out in all patients. Liver injury was present in 6 (7.5%) cases and repair was done.

Outcome

Most of the patients – [55 (68.75%)] had smooth post-operative course and discharged home in good general condition. Complications (Table 4) were encountered in 25 patients (31.25%) and two patients died due to sepsis.

DISCUSSION

In our study penetrating abdominal injuries affects young patients, where the mean age was found to be 29 years. This is compared to a mean age of 28 to 30 years, reported in other studies (Asuquo, 2012; Mnguni, 2012; Monzon-Torres and Ortega-Gonzalez, 2004; Salim and Velmahos, 2002; Navsaria *et al.,* 2007; Ohene-Yeboah *et al.,* 2010). The large bulk of our patients (88.75%) were in the Second to fourth decade of their liveliness. This had been distinguished by another author previously (Mnguni, 2012). The preponderance of male gender 96.25% in our study were well described by others, 82.2% - 96.5% (Mnguni, 2012; Monzon-Torres, 2014; Navsaria *et al.,* 2007; Ohene-Yeboah; 2010; Gaudeuille *et al.,* 2007).

Mode of Injury

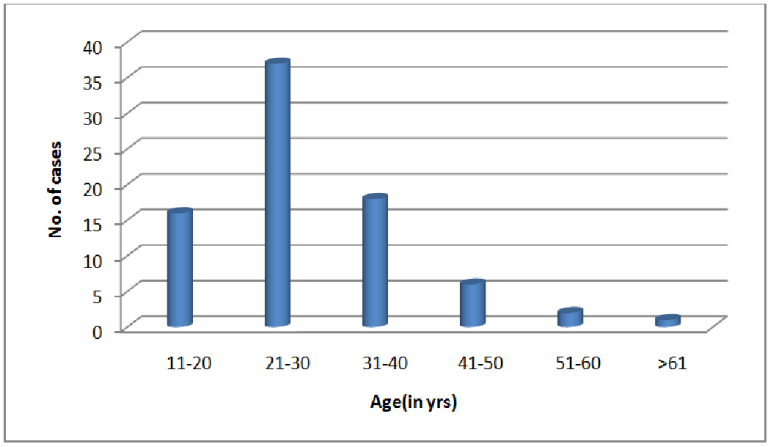
The causes of PAIs vary from place to place. In our study the mode of injury being stab wounds, of which majority was homicidal in nature.

Presentation

The presentation of patients with penetrating abdominal injuries might be in state of hemorrhagic shock, features of peritonitis or just with omentum/bowel evisceration. In our study, 31.25% were hemodynamically unstable when first seen and this agrees with 28.1% (Siddig and Ahmed, 2008).

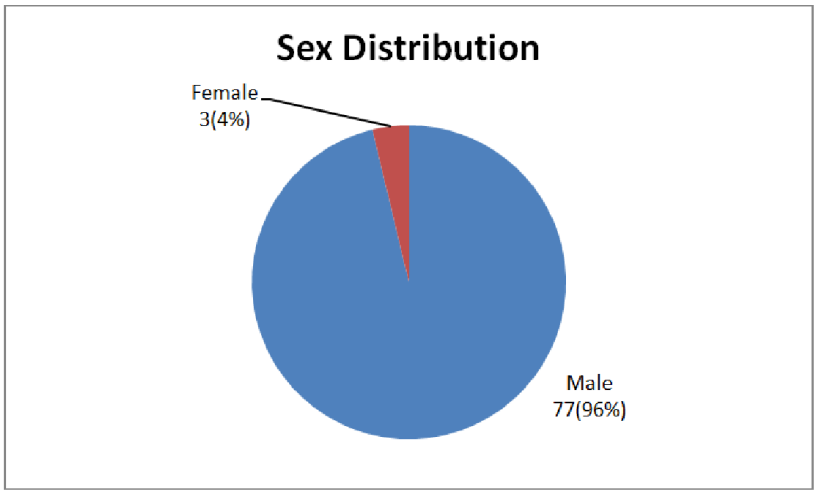
Table 1. Age distribution in the study population (n = 80)

AGE (in years)	No. Of cases	%
11-20	16	20
21-30	37	46.25
31-40	18	22.5
41-50	6	7.5
51-60	2	2.5
>61	1	1.25



Graph showing AGE distribution

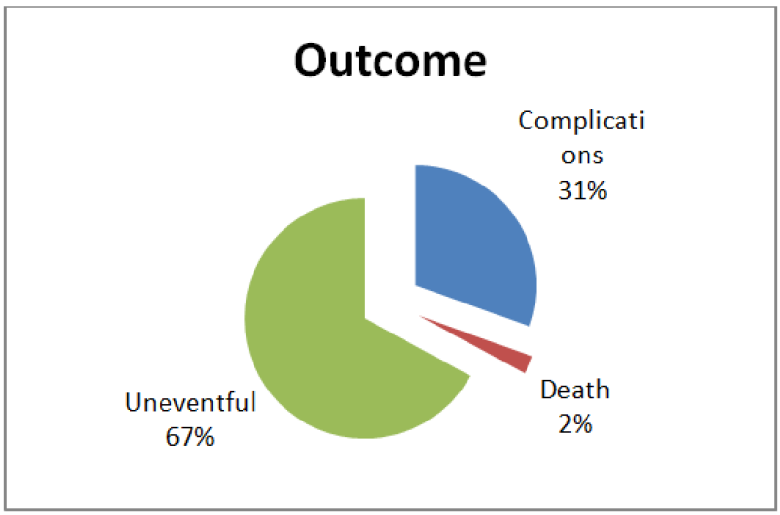
Table 2. Sex distribution in the study population



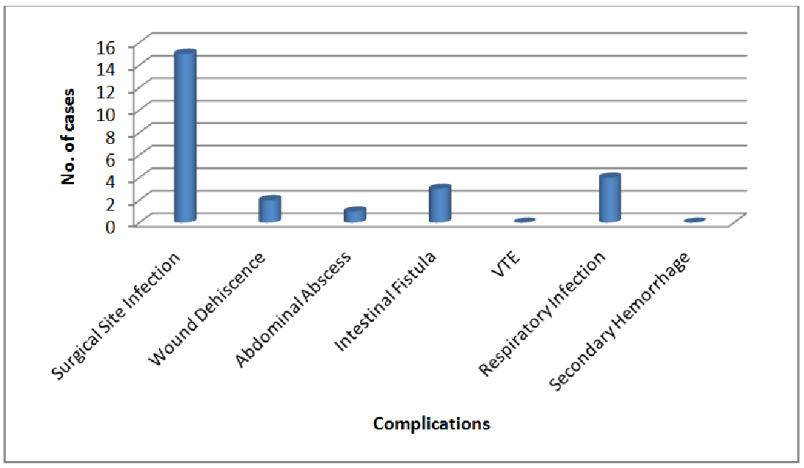
A pie chart showing sex distribution

Table 3. Subtype of abdominal injuries and their treatment in the operated patients (n =80)

Injured Organ	No. (%)	Procedure Done	No.(%)
A.Parietal Wall	15(18.75)	Repair	15(18.75)
B.Stomach	08(10%)	Primary Repair	08(10%)
C)Small Bowel:			
C1:Duodenum	02(2.5%)	Primary Repair	20(62.5%)
C2:Jejunum	22(27.5%)	R&A	12(37.5%)
C3: Ileum	08(10%)	----------	----------
D) Large Intestine:			
D1-Cecum	0(0%)	Primary Repair	20(80%)
D2-Ascending Colon	05(20%)	Colostomy	05(20%)
D3-Transverse Colon	18(72%)	----------	----------
D4-Rectosigmoid	0(0%)	----------	----------
E)Mesentery	08(10%)	Closure of defect	08(10%)
F) Solid Organs			
F1-Liver	06(7.5%)	Hepatorraphy	06(7.5%)
F2-Spleen	10(12.5%)	Splenectomy	10(12.5%)
G)Vascular Injury	04(5%)	Repair	04(5%)
H)Combined Injuries			
B+f1	01(1.25%)	----------	----------
C2+f2	01(1.25%)	----------	----------



Pie chart showing outcome



Graph Showing Complications

Table 5. Showing Mode of Injury

Mode of Injury	No. of cases	%
Homicidal	67	83.75
Accidental	13	16.25

Table 6. Showing presentation of patients in Emergency Department

Presentation	No. of cases	%
Hemodynamically Stable	55	68.75
Hemodynamically Unstable	25	31.25
Peritonitis – Present	20	25
Peritonitis – Absent	60	75

Table 7. The percentage of operative treatment in patients with penetrating abdominal injuries among different studies

Study	Year	No. of cases	Operative Management
Monzon BD et al[8]	2004	85	89.9%
A.E.Dongo et al[18]	2011	71	100%
Maurice, et al[6]	2012	29	86.2%
M.A. Gad et al[15]	2012	76	100%
Current Study	2015	80	100%

In these cases of shock, solid organ and vascular injuries were common. Peritonitis was present in 25% of cases which was comparable to others (Siddig and Ahmed, 2008). In this respect hollow organ injuries were frequently encountered.

Treatment

Surgical exploration remains the standard of practice for most penetrating solid organ injuries. There is no dispute regarding the fact that patients with peritonitis or hemodynamic instability should undergo urgent laparotomy after penetrating injury to the abdomen (Como *et al.,* 2010). A small number of studies have suggested that selective non operative management of penetrating injuries is safe and has been shown to reduce number of unnecessary laparotomy, length of hospital stay, and management cost (Inaba, 2007; Plackett, 2011). In studies done by Monzon and Maurice non operative management was done in patients who were hemodynamically stable, no signs of peritonitis, no organ evisceration, no haemoperitoneum and no solid organ injury on CECT scan. Clinical and diagnostic studies should be able to select patients in whom non operative management can be done. When these studies are unable to exclude severe injury, laparotomy remains more prudent than expectant observation (Van Brussel, 2001). There is no gold standard investigation to detect mild/moderate haemoperitoneum and solid organ injury accurately. Ultrasonography lacks sensitivity and specificity and is highly operator dependent with inter observer variation. CECT facilities are not available everywhere and its accuracy in emergency situations cannot be relied, especially in the early period. The crux in managing such patients lies in timing of surgery, which if delayed may cause morbidity/mortality or if done early may lead to unwanted laparotomy. Emphasis must be laid to identify those small subsets of patients in whom early identification of injury may avoid laparotomy. Hence proper clinical evaluation and operative assessment is gold standard in such situation and early surgery is the only treatment modality.

Intra-Abdominal Injuries

The most common injured organ in our study was bowel 71.25% (small bowel 40%, large bowel 31.25%) followed by spleen 12.5% and stomach 10%. In literature small bowel injuries account for 23-74% (Van Brussel *et al.,* 2001; Uludag *et al.,* 2009), while large bowel injuries reported in 6.3-33.7% (Uludag *et al.,* 2009). The small and large bowel injuries in our study were similar to other series. The described stomach injuries 0.0-23.6% (Uludag *et al.,* 2009) was similar to others. 20% of our patients had solid organ injury (Liver 7.5%, Spleen 12.5%). In other studies, the rate of liver injuries was found to be between 7-10%. Splenic injuries in the literature were similar to ours. No biliary /pancreatic injuries were reported in our study as others (Pandey *et al.,* 2011). Our rate (7.2%) of negative laparotomy compares well with Maurrice *et al* (4%) and Pardeep *et al* (8.1%) which is acceptable.

Outcome

Patients who recovered satisfactorily without complications in our study 68.75% compares well with Maurice *et al.,* 84% (Asuquo *et al.,* 2012) and Monzon *et al.,* 69.6% (Monzon-Torres and Ortega-Gonzalez, 2004). The rate of post-operative morbidity was high (31%) in our patients compared to 6% - 8% in other series (Mnguni *et al.,* 2012; Siddig and Ahmed, 2008). This was attributed to the development of surgical site infection, though our frequency of 18.75% was comparable to 6.9% - 18% level of wound infection documented by other[9]. In our study there were 2 mortality cases (2.5%) and this is similar to the findings in the literature (Saghafinia *et al.,* 2010; Asuquo *et al.,* 2012; Mnguni *et al.,* 2012; Monzon-Torres and Ortega-Gonzalez, 2004; Salim and Velmahos, 2012). The duration of admission in this study was 9 days, in keeping with previous studies elsewhere that confirmed the mean time for hospitalization to range between 9.2 and 10.5 days (Mnguni *et al.,* 2012).

Conclusion

The study shows no difference in the pattern of intra-abdominal injuries regardless of the means of penetrating abdominal injury. The rate of operative treatment is satisfactory, but laparotomies can be avoided in hemodynamically stable patients without peritonitis provided more sensitive investigations are available which can identify early/minor injuries. There is a need to identify new imaging modality/ procedure which helps to determine the management scheme. Till date many investigations / procedures have been proposed, but none have withstood the test of time. The overall outcome was acceptable and comparable to other studies.

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