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Original article :

A clinical study on penetrating abdominal trauma and its outcome at a tertiary care Institute in Goa

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Abstract

Background: Worldwide trauma is one of the main cause of morbidity and mortality and is still the most frequent cause of death in the first four decades of life. One of the important causes of surgical emergencies is Penetrating trauma to abdomen. A cohort from young to middle aged productive adults represents with shock, peritonitis and evisceration secondary to the penetrating abdominal wounds. Studies suggest that these cases usually lead to early laparotomy however the number of studies conducted in this regard are scarce.

Aims & Objectives: This study was conducted with the aim to study various organs affected in penetrating abdominal injuries, indications for emergency laparotomy and complications encountered and their management.

Materials and Methods: This was a prospective study with purposive sampling having 53 samples with penetrating wounds in the abdomen. The cases considered were purposively sampled based on presenting complains, confirmation of type of injuries through physical examination and radiological findings. All the patients with generalized tenderness, hemodynamic instability and peritoneal penetration underwent laparotomy.

Results: Young population within the age group of 21-30 years were most commonly affected(34%), with male predominance(92%). Stab injury to the abdomen was the commonest type of injury with assaults being the commonest mode of injury. Overall 35 patients had significant abdominal signs such as peritoneal penetration on local wound exploration, generalized peritonitis, hemodynamic instability and evisceration of bowel/ omentum and were explored.Small bowel was the most common organ involved(13%). Local wound infection(46%) was the most common complication encountered, followed by wound dehiscence(20%)

Conclusion: Signs of hemodynamic instability, generalized peritonitis, evisceration and peritoneal breach are reliable criteria for emergency laparotomy. Selective conservatism can be applied for patients without peritoneal breach on local wound exploration and with no abdominal findings or hemodynamic instability on repeated clinical examinations.

Key Words- Penetrating, Laparatomy, stab, abdomen

INTRODUCTION-

Penetrating injuries are an important and widely encountered indicator for surgical emergencies. These injuries are encountered mostly in Males (87.3%) predominated with the age range between 21 and 30 years. This category is at a vital threshold of their prime functioning of life and living a healthy life.The productivity of this cohort is very high and these lives are very important to their families as well as to the Society which pays a high cost of loss of human resource and bread earners also adding to the cost of treatment therewith[1] The most common cause is a stab or gunshot. The most common organs injured are the small bowel (50%), large bowel (40%), liver (30%), and intra-abdominal vascular (25%). When the injury is close range, there is more kinetic energy than those injuries sustained from a distance. Even though most gunshot wounds typically have a linear projection, the high-energy wounds are associated with unpredictable injuries. There may also be secondary missile injuries from bone or bullet fragments. Stab wounds that penetrate the abdominal wall are difficult to assess. Occult injuries can be missed, resulting in delayed complications that can add to the morbidity.[2-4]

Abdomen is most susceptible and vulnerable for homicidal or accidental injuries owing to its position in human anatomy. Penetrating trauma of the abdomen continues to be a major cause of trauma admissions. Stab wounds (SW) are encountered three times more often than gunshot wounds (GSW), but have a lower mortality because of the lower energy transmitted. Approximately 90% of the deaths related to penetrating abdominal injury (PAI) are caused by GSW.[5]

Penetrating wounds were managed conservatively till late 19th century. There have been great advances made in the management of penetrating abdominal injuries since then. In 1960,Shaftan suggested selective management in cases of stab wounds after observing increasing rates of negative laparotomies in patients with penetrating stab wounds. Major improvement occurred with introduction of blood transfusion and use of antibiotics with subsequent reduction in mortality rates.[6] Over the last 30 years the pendulum shifted towards selective management, initially involving only stab wounds and later including GSW. The introduction and refinement of diagnostic procedures and imaging studies, such as laparoscopy, Computed Tomographic (CT) scan, and Focused Abdominal Sonography for Trauma (FAST), has contributed significantly in the new trends of PAI management.[7]

In a developing nation like India, where the reach of healthcare facilities and trauma management centers is limited to their cities and metros , it is vital to identify and have in place a standard decision making tool to correctly identify cases that need laparotomy and those which can be managed with conservative treatment in penetrating abdominal trauma. This study thus emphasizes on evaluating the various indications for early laparotomy in patients with penetrating abdominal trauma.

MATERIALS AND METHODS-

This study was a prospective study of 53 cases of penetrating injury to abdomen admitted and attended in Hospital during the period from October 2019 to April 2021. This study captured data of all the patients admitted in the above facility with penetrating abdominal trauma.

The Proforma prepared for the data collection of the study covered demographic details, history of injury, presenting complains, details of investigations done and treatment provided along with operative procedures conducted, the span of hospital stay of the patient and the complications evident if any. The Proforma focused on capturing the vital information of the genders involved, the age group most often seen and the mode of injury of the cases attended in the selected timeframe. A detail of the investigations done, organs injured and the operative procedures performed emphasized on the mode of treatment and indications for Laparotomy.

STATISTICAL ANALYSIS:

The data was analyzed using SPSS Version software

RESULTS-

The age distribution of the cases revealed that most of the samples were from the age group between 21years of age to 50 years of age with 34% being in the age group of 21-30 years which is the economically productive age group of the country. While the trends lessen beyond the age group of 60. In the 53 cases studied, 49 cases were males and 4 cases were females [Table 1]. The most common type of penetrating abdominal trauma was stab injury (90.5%). Assault being the commonest mode of injury amongst stab injuries(53%). Around 62.5% of the stab injuries had significant findings and underwent laparotomy with assault being the most common mode of injury requiring laparotomy. (37.55)[Table 2]. Small bowel injuries were found in 13.3% of the cases whereas 7% of the cases involved injuries to the large intestine. All the patients with penetrating abdominal injuries underwent local wound exploration for the detection of peritoneal penetration. Wounds with evisceration of omentum and/or bowel were considered as positive peritoneal penetration and explored further during laparotomy. All the 30 patients with peritoneal penetration and/or evisceration underwent laparotomy. Evisceration with generalized tenderness were the most common indication for laparotomy(25.7%) followed by peritoneal penetration only (22.8%) [Table 3]. After a detailed clinical evaluation and suitable investigations, 35 patients with peritoneal penetration on local wound exploration, evisceration, those with hemodynamic instability, with peritoneal signs underwent exploratory laparotomy and 18 patients were selected for Local Wound Exploration [Table 4]. None of these required delayed laparotomy after being subjected to serial clinical examination.

The organs injured were analyzed. Many cases had multiple organ injuries and hence multi-targeted approach of treatment and operative procedures. It was seen that majority of the cases had small bowel, Liver, Mesentery or Mesocolon and Omentum injuries. Small bowel perforations were either closed primarily in double layer or resection was done of the diseased bowel with anastomosis or an ileostomy. Large bowel perforations were either brought out as stoma or primary suturing with covering colostomy was performed.Mesenteric injuries were treated by simple suturing and ligating the bleeding points. Among the sample under study,15 cases encountered complications post operatively. The most frequently evident post-operative complication was

wound infection(46%) and 20% of the cases had wound dehiscence [Figure 1]. The duration of stay of patients with penetrating trauma in the hospital ranged from 1 to 30 days with anaverage of 8 days.There was one mortality in the present study which was due to MODS. Mortality rate is 1.8%.[Table 5]

Table 1: Distribution of study participants by age group and gender

Parameters		Number of patients (n=53)	Percentage
Age in years	10-20	2	4
	21-30	18	34
	31-40	11	21
	41-50	14	26
	51-60	5	9
	61-70	1	2
	71-80	1	2
	81-90	1	2
Gender	Male	49	92
	Female	04	8

Table 2: Distribution of study participants by mode of penetrating injury:

Mode of penetrarting injury	Number of patients	Percentage
Homicidal stab injury	28	53
Accidental stab injury	19	35.8
Self-inflicted stab injury	6	11.3
Bull gore	5	9.4

Gun Shot Injury	**0**	**0**
Total	**53**	**100**

Table 3: Distribution of study participants by indication for laparotomy in penetrating abdominal trauma

Indication	No. of patients	Percentage(%)
Evisceration only	**3**	**8.5**
Evisceration with generalized tenderness	**9**	**25.7**
Evisceration with generalized tenderness with shock	**3**	**8.5**
Generalized tenderness only	**3**	**8.5**
Shock only	**2**	**5.7**
Peritoneal penetration on LWE only	**8**	**22.8**
Peritoneal penetration with generalized tenderness	**3**	**8.5**
Peritoneal penetration with generalized tenderness with shock	**4**	**11.4**

Table 4: Distribution of study participants based on therapeutic treatment done:

Therapeutic treatment	Number of patients	Percentage
Laparotomy	**35**	**66**
Local Wound Exploration	**18**	**34**

Table 5: Distribution of study participants by the duration of hospital stay of patients with penetrating trauma

Number of days	Number of patients
1-10	**46**
11-20	**6**

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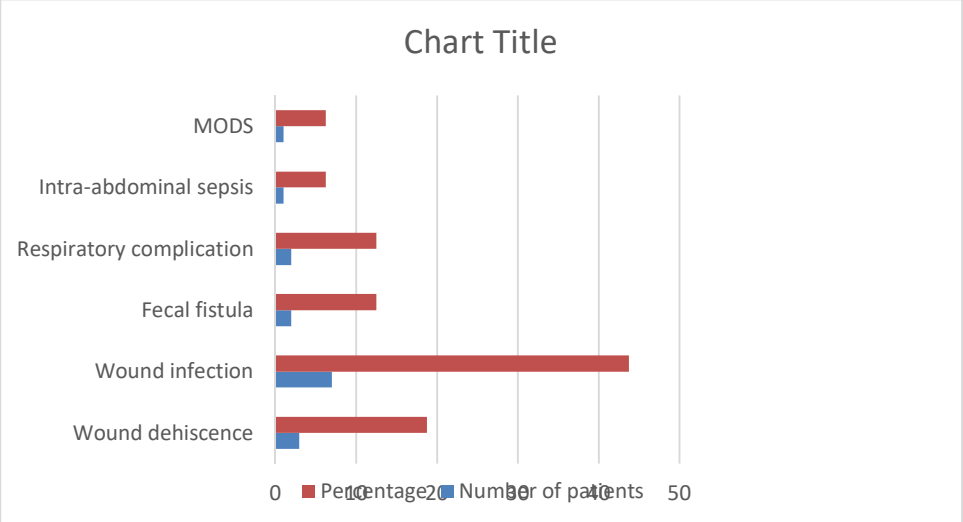
21-30	**1**
31-40	**0**
Total	**53**

Figure 1: Showing distribution of post operative complications



DISCUSSION-

The present study explored the penetrating injury incidences in the sample of 53 patients and revealed that a maximum of the sample was male (92%) whereas the rest was female (8%).This finding is consistent with the findings of a study by Ghosh P et al[1] where 87.3% of the sample was males and the rest were females. The findings also align itself with the conclusions of the study by In Nance FC et al [8](2016) males comprised 85% of cases and females comprised 15% of cases. The study also revealed that maximum samples ranged in the age group of 21-30 years which is a finding also consistent with the present study where 34% of the samples belong to the age group of 21 to 30 where as 11 percent belongs to the age group of 41-50. Therefore young and productive age group persons are the usual victims of penetrating trauma.

In the present study, stab injuries constituted the most common cause for penetrating injuries to abdomen accounting nearly 90.5%.This is consistent to the study Nance FC et al. (2016)[8]study stabjuries to abdomen accounted 53% of all penetrating injuries while gunshot wounds accounted for remaining 47%. The inconsistent result of the findings can be explained on the settings in which the study was conducted. The current study was conducted in a setting where possession of guns and arms is strictly controlled by the state. However there were 90.5% of cases which were stab injuries,of which assaults were found to be 58% and accidental were 39.5% .This study encounters bull gore injury as the second most common injury in the sample population, this findings are consistent with the study by Nance FC et al. (2016)[8]

In present study of 53 patients, 92%were males and 8% were females.Similarly male predominance was seen in studies conducted by Nance et al. and Leppanieme A K et al.[9]

The study encountered laparotomy as a therapeutic procedure conducted in 35 cases of penetrating injuries, which accounted to 66% of the total cases. Local Wound exploration however accounted to 34% of the cases. These results are in line with the results of study by Kamat G (2006) where the study encountered Laprotomy as a procedure to be conducted on 57% of the sample where as Local Wound Exploration on 43% of the sample.

In the present study, 66% of the cases of penetrating abdominal injury underwent laparotomy. In Leppaniemi AK et al. 68% of the cases underwent laparotomy which is consistent with the present study.

Many authors had found that mandatory laparotomy following peritoneal violation on LWE reported almost 50% negative laparotomies. Thompson and moore[10] found that LWE followed by DPL when peritoneal violation waslikely after stab wounds resulted in 8% unnecessary laparotomy rates.

In present study, all of the patients with hemodynamic instability, generalized peritonitis, evisceration of omentum and bowel were explored via midline laparotomy and subsequent management of the injuries.

Peritoneal penetration was noted in 82% of cases. In Leppaniemi ak et al. peritoneal perforation was present in 72% of the cases. This little difference was undetermined in the reference study.

In present study, omentum / bowel evisceration was present in 42% of the cases and all the cases were explored. This correlates well with study done by Nagy K et al.[11] in which evisceration was observed in 43% of the cases and was an indication of laparotomy.

Costa *et al*.[12]] reported the incidence of small bowel injury to be 10% whereas large bowel injury was identified in 6% of abdominal trauma patients. To compare this to the current study, small bowel injuries were found in 13.3% of the cases whereas 7% of the cases involved injuries to the large intestine.

Furthermore, Hildebrand *et al*.[13] reported an overall incidence of hollow viscus injuries to be 21% in penetrating abdominal trauma patients requiring laparotomies. In relation to these findings, the present study identified 24% of the penetrating abdominal trauma.

Hollow viscus injuries(22%) particularly small bowel injuries were most common in present study. This finding is consistent with Nance FC et al. study where small bowel and liver were the most commonly involved organs in penetrating abdominal trauma.In other studies (Lowe RJ et al [14] and Davidson et al [15]) GSWs to abdomen commonly cause injury to small bowel, colon and liver.

CONCLUSION:

Following the prospective study of 53 cases of penetrating abdominal trauma in the present study the following conclusions can be made. Young males in the productive age group of 20-30 years are predominantly affected. The commonest mode of penetrating injury was by stab injury to abdomen, assault being the most common cause followed by accidental stab injuries. The basis for conserving the patients of penetrating abdominal trauma were (1) LWE did not reveal peritoneal breach and (2) Repeated clinical examinations did not show abdominal findings or hemodynamic instability. All of the patients with hemodynamic instability, generalized peritonitis, evisceration of omentum and bowel were explored via midline laparotomy and subsequent management of the injuries. All the patients who present with evisceration after penetrating wound require a laparotomy. This is true regardless of what

has eviscerated or the presence of other clinical indications to operate. Evisceration continue to prompt operative intervention. Small bowel and liver were the commonest organs injured in the present study. Depending on the degree of contamination and the injury caused to the other organs, transmural colonic penetrating injuries were treated by colostomy. The hemodynamic stability also needs to be taken into consideration during the management.

Local wound infection was the most commonly encountered complication which were most commonly sSigns of hemodynamic instability, generalized peritonitis, evisceration and peritoneal breach are reliable criteria for emergency laparotomy. Selective conservatism can be applied for patients without peritoneal breach on local wound exploration and with no abdominal findings or hemodynamic instability on repeated clinical examinations. The need for early detection of the amount of damage by suitable imaging (X-ray, ultrasound, or CT abdomen) is critical. For hemodynamically stable patients with solid organ injury, conservative management can be considered.

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