

## Penetrating abdominal trauma: an experience at tertiary care centres

K. Rampal<sup>1</sup>, D. K. Prajapati<sup>2</sup>, H. Kaur<sup>1</sup>, P. S. Sandhu<sup>1</sup>, H. Singh<sup>1</sup>, M. Sharma<sup>3</sup>

<sup>1</sup>Guru Gobind Singh Medical College & Hospital, Faridkot, India.

<sup>2</sup>Gajra Raja Medical College Gwalior, India.

<sup>3</sup>Government Medical College, Amritsar, India.

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### Introduction

Stab injuries of abdomen are an ever increasing presentation in the emergency department of various hospitals. Abdominal stab wounds may or may not penetrate into the peritoneal cavity and this for long has been the deciding factor while planning the further line of management for the patient. Stabs that penetrate the abdominal cavity may or may not cause the evisceration of omentum or abdominal organs [Figure 1,2,3]. Omental or organ evisceration has been associated with intra abdominal injuries in 68%-75% of the cases (1). This association has been responsible for the formulation of exploratory laparotomy being accepted as the standard line of management for such cases (2). The association is stronger with the evisceration of organs than with omentum alone<sup>3</sup>. Asymptomatic patients with penetrating stab wounds have been reported to have significant intra abdominal injuries in 36.5% cases (3).

As there has been an advancement in radiological techniques and also the availability of minimal invasive equipment has seen an upward trend, non operative management penetrating abdominal trauma (PAT) has continuously evolved and is gaining wider acceptability(4,5,6)]. Non operative management involves careful clinical examination, judicious use of available radiological investigations and intensive care facilities (7). Organ evisceration is long recognized and

accepted indication of exploratory laparotomy while omental evisceration is a relative indication for surgical intervention and often institutional practices vary. Uses of tomographic scans, ultrasound and diagnostic peritoneal lavage have enjoyed success but do have their limitations (8). The use of diagnostic laparoscopy offers advantage of a possible therapeutic intervention besides diagnosis (9). But the use of diagnostic laparoscopy too has been marred by its general unavailability in the emergency department settings, especially in developing country set ups. Also a high rate of missed injuries has been reported in studies on use of diagnostic laparoscopy in penetrating abdominal trauma (10). We have aimed to study the feasibility of conservative management by observing the outcome and findings in patients of penetrating trauma abdomen reporting to us.



**Figure 1.** omental evisceration



**Figure 2.** omentum and gut evisceration



**Figure 3.** gut evisceration

Correspondence: M. Sharma

E-mail: smeghna2012@gmail.com

 <https://orcid.org/0000-0002-8134-6008>

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## Aims and objectives

To observe patient profile, operative findings, clinical course and outcome in patients with penetrating abdominal trauma, with and without evisceration of intra abdominal contents presenting to the emergency department of our institutes.

## Materials and Methods

All patients presenting with and without evisceration of intra abdominal contents following penetrating stab injuries were observed from July 2013 to December 2020. All individual patients were followed up for 06 months post discharge through telephonic communication.

Patients with hemodynamic instability, peritonism, solid or hollow viscus evisceration and radiological evidence of bowel perforation were taken up for upfront laparotomy. Hemodynamic instability was labeled when the patient failed to respond to initial fluid challenge. Of these, the patient who were operated with simultaneously ongoing resuscitation were included in emergency laparotomy group, those who were operated after formal resuscitation but within 08 hours of presentation were put in early laparotomy group and those operated after 08 hours of presentation formed the late laparotomy group. Injuries that crossed the posterior fascia of the abdominal wall on local exploration were taken as penetrating abdominal trauma. Both omental and organ evisceration cases were taken up for laparotomy as per our institutional practices. Penetrating stabs with no tissue evisceration (omental or organ), hemodynamically stable, no peritonitis cases and cases with no radiological evidence of hollow viscus perforation formed the conservative management group. Those in conservative management group were subjected to continuous vitals monitoring, two hourly assessments for peritonitis, twice daily basic hematological investigations, Contrast enhanced computer tomogram on arrival, daily urine routine microscopy and daily chest and abdomen X-ray examination for 72 hours. Patients were kept nil per orally in anticipation of a possible surgical intervention for at least 24 hours. Uncooperative patients, pregnant females, non consenting individuals, gunshot abdominal injuries and brought dead cases were excluded from the study. We observed age, sex, site of injury, findings on laparotomy, mortality and morbidity data.

## Statistical analysis

Normally distributed continuous variables were recorded as mean and categorical variables were expressed as percentage.

## Results

We studied 72 patients with penetrating abdominal trauma (PAT) presenting to our institutes. We observed evisceration to be present in 48 patients forming 66.67% of total patients. Non evisceration PAT was observed in 24 patients forming the remaining 33.3% patients. Males were the predominant victims constituting 84.7% cases while the females accounted for 15.2% cases. PAT injuries were also predominant in the younger age groups lying in the 18-40 years age bracket (55.5% cases). Mean age of the victims is 38.4 years. Youngest patient who reported us aged 16 years while the oldest patient that we had aged 74 years. Amongst the patients having evisceration of abdominal content, 36 patients (75%) had isolated omental contents while 12 patients (25%) had organ evisceration. Two patients had stomach as the eviscerated organ while rest had small bowel as the eviscerated organ. [Table 1]

Twelve patients were haemodynamically unstable and were taken up for emergent laparotomy with simultaneous resuscitation. 32 patients responded to initial resuscitation and were operated within 08 hours of presentation, constituting the early laparotomy group. 08 patients were operated after 08 hours, forming the late laparotomy group. Four of these late operated patients were from non eviscerated PAT category, which were earlier kept under conservative management but had to be operated based upon radiological findings or development of generalized peritonitis. [Table 1]

Per operatively twenty six patients (46.2%) were found to have bowel perforation with fourteen of these patients having multiple perforations. Perforation of bowel was seen in 100% cases with gut evisceration while 38.9% of cases with omental evisceration had associated bowel perforation. Isolated mesenteric injury was seen in ten patients (17.8%) while only four (7.1%) patients had isolated serosal tears without any bowel perforation. [Table 1]

Solid organ injury was detected in twelve patients out whom six (10.7%) patients had isolated solid organ injury. 77.9% injuries were sustained in the upper abdomen (above the level of umbilicus). Epigastrium was the most common region to be involved contributing 25% to the total cases. Multiple PAT injuries involving same region or more than one region of abdomen were seen in 18 cases (25%). Multiple PAT injuries are an indicator of the viciousness of the assailant. [Table 1]

Time of arrival to hospital post injury is often the key factor deciding recovery. We received 77.8% of our patients within six hours of injury. 38.9% out of these, presented in the two to four hours bracket. [Table 1]

Post operative complications were observed in 30 cases accounting for 41.4% of the total cases. Post operative fever was the most common complication seen 26.3% cases. 23.6 % cases had wound site infections. Chest related complications were seen in 8.3% cases. Most complications were self limiting responding to conservative management and only one case required re- exploration for anastomotic complication. We did not observe any mortality. [Table 1]

All conservatively managed cases were discharged within the first week with 37.5% of them getting discharged within three days. Majority of the cases including the operated category were sent home by 10 days and only 4 patients (5.5%) stayed beyond two weeks. Maximum observed stay was of 04 weeks. [Table 1]

## Discussion

Penetrating abdominal injuries are a very common presentation in the emergency departments of all tertiary care hospitals. Majority of the cases in the past were subjected to exploratory laparotomies resulting in high rates of negative laparotomy. Leppaniemi et al showed cost effective management in PAT case with observant treatment through a shorter mean hospital stay of 2 days (11). We discharged 37.5% of conservative group patients in 03 days. Shaftan had questioned the routine use of laparotomy in abdominal trauma in his study published in 1960 and used peritonitis, intestinal bleed and paracentesis as indicators for surgery (12). We in our study are in coherence with this approach. M. Ohne Yeboah et al have highlighted high negative laparotomy rates in their country due to continuous practice of laparotomy for every PAT (13). They also found that peak age of presenting cases was 20- 29 years with 39.9% cases belonging to this age group. 33.3% of our cases are in the age of 18-30 years. They subjected 80.5% of their cases to laparotomy while we applied surgical management to 77.8% of our cases. They reported 29% negative laparotomies. We avoided surgery in stable non evisceration PAT, but still highlight the possible avoidance of surgery, in our cases with isolated serosal tears and isolated solid organ that formed 17.8% of our cases.

Clarke et al emphasised need for restricting laparotomies to patients with peritonitis and haemodynamic instabilities (14). They also reported that 20% of conservatively managed cases ultimately require surgery that in our study is only 2.24% (04 cases). M Silva et al 86.4 % cases with evisceration had internal injuries (15). We found bowel perforation in 100% cases with gut evisceration and 38.9% of cases with omental evisceration. Organ evisceration hence is an indication for laparotomy due to the high frequency of intra abdominal injuries associated with it, while omental evisceration cases are increasingly being dealt with local wound management,

intensive care protocols and radiological support. Maurice Asuque et al have highlighted gut perforation as the most common injury sustained in PAT, corroborating our results (16). They managed 13.8% cases conservatively where as we had 22.2% patients under conservative management. Shahin Hajibendeh et al have demonstrated the advantage of using laparoscopy as means to reduce hospital stay, reduce post laparotomy complications and in avoiding negative laparotomies too (17). They found laparoscopy to be 100% sensitive in PAT. We like majority of the institutes in developing nations did not have the availability of laparoscopic set in emergency departments. Wherever available, laparoscopy can go a long way in avoiding negative laparotomies.

## Conclusion

We need to curtail laparotomies in penetrating abdominal trauma while still maintaining high levels of vigil for missed intra abdominal trauma. Use of minimal invasive techniques with judicious use of CT scans needs to be encouraged to arrive at desirable outcomes.

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**Table1 - Multiple variable analysis**

| Multiple variable analysis                          |                    |           |              |                    |
|-----------------------------------------------------|--------------------|-----------|--------------|--------------------|
| Category                                            |                    | Value     |              | Percentage( Total) |
| Sex                                                 |                    |           |              |                    |
| Male                                                |                    | 61        |              | 84.7               |
| female                                              |                    | 11        |              | 15.2               |
| Age in years                      Mean – 38.4 years |                    |           |              |                    |
| Less than 18 years                                  |                    | 1         |              | 1.4                |
| 18-30                                               |                    | 24        |              | 33.3               |
| 31-40                                               |                    | 16        |              | 22.2               |
| 41-50                                               |                    | 11        |              | 15.3               |
| 51-60                                               |                    | 11        |              | 15.3               |
| 61-70                                               |                    | 8         |              | 11.1               |
| More than 70                                        |                    | 1         |              | 1.4                |
| Evisceration                                        |                    |           |              |                    |
| Yes                                                 |                    | 48        |              | 66.7               |
| No                                                  |                    | 24        |              | 33.3               |
| Eviscerated content                                 |                    |           |              |                    |
| Omentum                                             |                    | 36        |              | 75                 |
| Organ                                               |                    | 12        |              | 25                 |
| Management                                          |                    |           |              |                    |
| Surgery                                             |                    | 56        |              | 77.8               |
| Conservative                                        |                    | 16        |              | 22.2               |
| Hemodynamic instability                             |                    | 12        |              | 16.7               |
| Operative findings                                  |                    |           |              |                    |
| Hollow viscus perforation                           |                    | 26        |              | 46.2               |
| Isolated mesenteric injury                          |                    | 10        |              | 17.8               |
| Isolated serosal tears                              |                    | 4         |              | 7.1                |
| Isolated solid organ injury                         |                    | 6         |              | 10.7               |
| Area of Injury                                      |                    |           |              |                    |
| Epigastrium                                         |                    | 18        |              | 25                 |
| Left hypochondrium                                  |                    | 10        |              | 13.9               |
| Left lumbar                                         |                    | 6         |              | 8.3                |
| Left iliac                                          |                    | 3         |              | 4.1                |
| Hypogastrium                                        |                    | nil       |              | nil                |
| Right iliac                                         |                    | 3         |              | 4.1                |
| Right lumbar                                        |                    | 7         |              | 9.7                |
| Umbilical                                           |                    | 1         |              | 1.4                |
| Multiple                                            |                    | 18        |              | 25                 |
| Time of arrival after injury                        |                    |           |              |                    |
| Less than 02 hours                                  |                    | 4         |              | 5.6                |
| 2- 4 Hours                                          |                    | 28        |              | 38.9               |
| 4-6 hours                                           |                    | 24        |              | 33.3               |
| More than 06 hours                                  |                    | 16        |              | 22.2               |
| Post operative complications                        |                    | Operated  | Conservative |                    |
| Fever                                               |                    | 18[32.1%] | 1[6.25%]     | 26.3               |
| Wound infection                                     | Primary stab wound | 6[10.7%]  | 2[2.7%]      | 11.1               |
|                                                     | Laparotomy wound   | 9 [16%]   | -            | 12.5               |
| Multiple transfusions                               |                    | 4[7.1%]   | 1[6.3%]      | 6.9                |
| Bowel leak/anastomotic complications                |                    | 1[1.7%]   | -            | 1.4                |
| Chest or lung complications                         |                    | 6[10.7%]  | -            | 8.3                |
| Hospital stay in days                               |                    |           |              |                    |
| 0-3                                                 |                    | -         | 6(37.5%)     | 8.3                |
| 4-7                                                 |                    | 08[14.3%] | 10[62.5%]    | 25                 |
| 8-10                                                |                    | 34[60.7%] | -            | 47.2               |
| 11-14                                               |                    | 10[17.9%] | -            | 13.8               |
| More than 02 weeks                                  |                    | 4[7.1%]   | -            | 5.5                |