SAS Journal of Surgery (SASJS) **ISSN 2454-5104**
Abbreviated Key Title: SAS J. Surg.

A Unit of Scholars Academic and Scientific Society, India

Surgical Management of Isolated Trauma to the Abdomen-- In a Tertiary Care Centre

Kodenge Raghavendra Rao[1], Samir Ranjan Nayak[2*], Surya Chitanya[3], Vegulla Venkata Mukesh[4], Kallem Shekhar Reddy[5], Sana Vijaya[6]
[1, 2]Professor GSL Medical College and General Hospital Andhra Pradesh 533296 India
[3-6]Resident surgery GSL Medical College and General Hospital Andhra Pradesh 533296 India

Original Research Article

***Corresponding author**
Samir Ranjan Nayak

Article History
Received: 15.09.2018
Accepted: 28.09.2018
Published: 30.09.2018

DOI:
10.36347/sasjs.2018.v04i09.006

Abstract: Isolated trauma to the abdomen is a frequent emergency and is associated with significant morbidity and mortality in spite of improved recognition, diagnosis and management. Trauma is the second largest cause of disease accounting for 16% of global burden. The World Health Organization estimates that, by 2020, trauma will be the first or second leading cause of years of productive life lost for the entire world population [1]. A retrospective analysis of 23 cases that underwent exploratory laparotomy for an indication of isolated trauma to the abdomen the period between June, 2015 and December, 2017. Of the 23 cases that were included in the study it has been observed that the median age of patients has been 38.6 years and 21(91.3%) were male and 2(8.7%) were female. 22(95.6%) cases were managed successfully and had recovered while 1(4.4%) case expired. Prognosis depends on early arrival and intervention. The analysis of patient data reveals that virtually all cases of isolated trauma to the abdomen requiring surgery can be successfully managed at an adequately equipped tertiary care center.
Keywords: Trauma, abdominal injury, laparotomy.

INTRODUCTION

Trauma is the leading cause of death under the age of forty. Of all traumatic deaths, abdominal trauma is responsible for 10 % [2]. Due to the complex nature of abdominal injuries and the composition of the abdominal region, many patients will not present with any outward signs of trauma [3]. The abdominal region is comprised of a number of organs, tissue and blood vessels, which increases the chance of severe injury.

When a patient receives an abdominal injury, there is a chance that more than one area of the abdominal region will be impacted, which could cause life threatening complications. Like the injuries themselves, the risks associated with abdominal trauma range in severity depending on the type and cause of injury as well as the location of the injury.

Up to 50% of cases of isolated trauma to the abdomen can be dealt with by conservative management [4]. Patients with hemodynamic instability and features of peritonitis must be considered for exploratory laparotomy but this thought is not without controversy [5].

India being a developing country poses a threatening situation where victims of trauma to the abdomen do not always possess resources and awareness to present early to a specialty level care centre and the process is further hindered by local quacks and religious healers.

A laparotomy is typically used in patients with acute or unexplained abdominal pain and patients who have sustained abdominal trauma in the presence of hypotension, a positive FAST or DPL [6]. But emergency laparotomy is a major form of intervention which confers a mortality rate reported to be around 19.5 % [7]. Another study showed a mortality rate of a crude 30-day hospital mortality rate of 14·9 (range 3·6–41·7) per cent, rising to 24·4 per cent in patients aged 80 years and over [8]. There is increasing recognition that outcomes after emergency major general surgery are poor and would benefit from standardization of care [9-11].

METHODS

This case study comprises a retrospective analysis of 23 cases that underwent emergency laparotomy after sustaining injury to the abdomen in the period between June, 2015 and December, 2017. The patients with associated injuries such as head injury, long and pelvic bone fractures, which could significantly add to their mortality or morbidity, were not included in the study. There was no age limitation

to the cases selected. All cases underwent investigations as seen fit and were handled by a team comprising of a consultant level surgeon, anesthetist and radiologist. Exclusion of cases with concomitant head injury was based on the CT brain findings. Exploratory laparotomy in abdominal stab wounds was considered when there was a suspicion of peritoneal breach. Patient's blood samples were sent upon admission for hematological work up. Initial resuscitation and fluid management was carried out in all cases. Patients with features of shock unresponsive to fluid challenge were considered to have ongoing hemorrhage. The patients were managed for a time period seen fit in an ICU after the procedure and were evaluated for 1 month. The minimum stay was for 5 days and the maximum stay was for 40 days.

RESULTS

The ages of the patients included in the study were as follows:

Table-1: showing the age distribution amongst cases included in the study

Age range	number	Percentage
0-9 years	1	4.3%
10-19 years	2	8.6%
20-29 years	6	26%
30-39 years	3	13%
40-49 years	4	17.3%
50-59 years	3	13%
60-69 years	2	8.7%
70-79 years	2	8.6%
80-89 years	0	0
total	23	

21 (91.3 %) of the 23 cases included in the study were male patients and 2 (8.7 %) cases were females.

16 (69.5 %) cases of the 23 arrived to the hospital within 6 hours of the incident and 3 (13 %) arrived between 6 and 48 hours of the incident and 4 (17.5 %) cases arrived after 48 hours since the traumatic event occurred.

2 (8.6 %) cases were involved with penetrating injuries to the abdomen while the remaining 21 (91.4%) cases had a history of blunt trauma to the abdomen.

Table-2: Showing the time of arrival of various patients

Time of arrival	number	Percentage
<6 hours	16	69.5
6-48 hours	3	13
>48 hours	4	17.5
total	23	

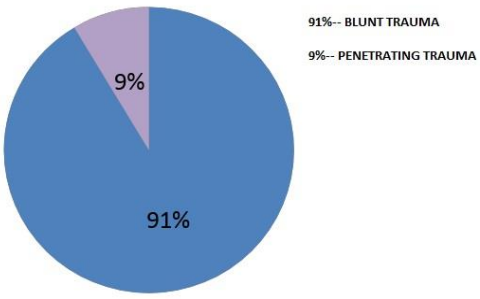

Fig-1: Pie chart showing percentage of injuries that were caused by blunts trauma and penetrating trauma

All 23 (100%) of the patients had a presenting complaint of pain abdomen. 15 (65.2%) had a complaint of distention. 5 (21.7%) of patients had fever on presentation. 6 (26%) had nausea on arrival. 1 (4.3%) had constipation as a presenting feature and 22 (95.7%) patients could recall a history of trauma.

Table-3: showing presenting features amongst the patients that underwent emergency laparotomy for trauma

Presenting feature	Number	Percentage
Pain	23	100
Trauma	22	95.7
Distention	15	65.2
Nausea	6	26
Fever	5	21.7

17 (74%) of patients had tachycardia (>90) on initial examination and 6 (26%) had a heart rate of 90 or below. 5 (21.7%) of patients were hypotensive on admission with a systolic BP recorded below 90 mmhg and 1 (4.3%) patient was hypertensive on admission. 17 (74%) patients were found to have tachypnea (>20) on admission. 19 (82.6%) patients were found to be febrile on admission.

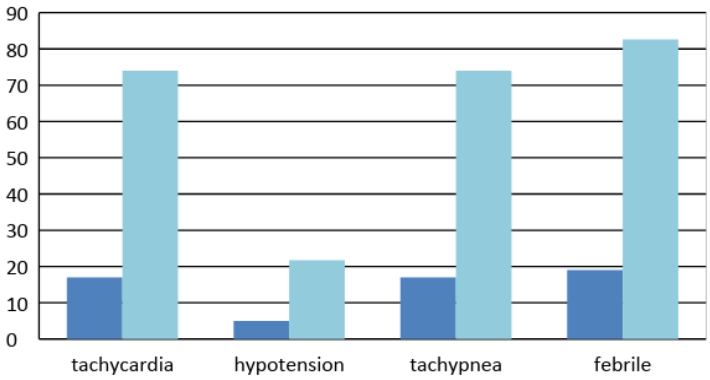

Fig-2: Vital signs on examination of the patients on admission

On examination of the abdomen of patients the following signs were elicited

Tenderness was seen in all 23 (100%) of the cases whereas distention was seen in 10 (43.4%) cases. Guarding and rigidity were seen in 5 (21.7%) cases.

Renal function tests were deranged in 1 (4.3%) patient and electrolyte disturbance was seen in 1 (4.3%) patient.

Diagnosis necessary for intervention in the form of emergency laparotomy was attained by use of CT scan in 19 (82.6%) cases, FAST in 4 (17.4%) cases and DPL was not used in any circumstance.

Table 4: showing different signs elicited in patients admitted for emergency laparotomy

Sign	Number	Percentage
Tenderness	23	100
Distention	10	43.4
Guarding	5	21.7
Rigidity	5	21.7

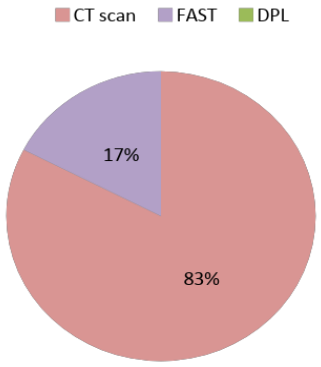

Fig-3: pie chart showing distribution of investigation modalities used to attain diagnosis for decision making

9 (39.1%) cases were operated on a diagnosis of splenic laceration. 6 (26%) cases were operated on a diagnosis of injury to hollow viscus. 2 (8.9%) cases were operated on a diagnosis of liver laceration. 5 (21.7%) cases were operated on a diagnosis of haemoperitoneum and 1 (4.3%) case was operated on an assumption to be acute intestinal obstruction.

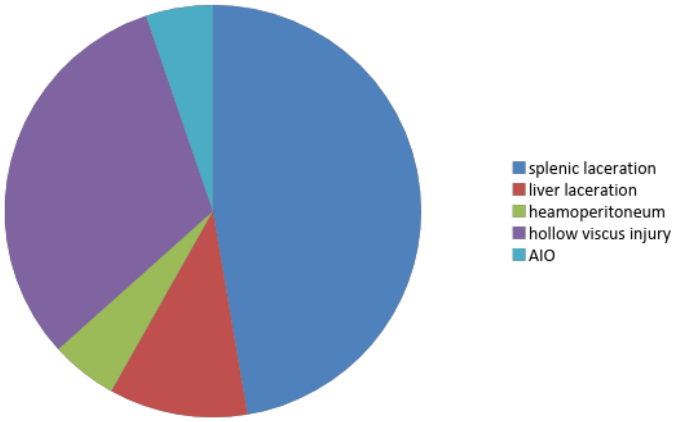

Fig-4: pie chart showing the distribution of pre-operative diagnoses under which the patients underwent emergency laparotomy. TLC count was elevated (>12000/mm^3) in 19 (82.6%) cases

4 (17.4%) cases had co morbidities along with the presenting complaints. Of these comorbidities hypertension was seen in 4 (17.4%) cases. Type 2 Diabetes was seen in 2 (8.7%) cases and COPD was seen in 1 (4.3%) case.8 (34.7%) cases were found to be anemic with Hb< 10g/dl and 3 (13%) cases were found to have hypoproteinemia (<3.5g/dl).

14 (60.8%) cases were shifted to operating room within 6 hours after their arrival for definitive management. In 6 (26%) cases it took between 6 and 24 hours to shift the patient into the operating room. In 1 (4.3%) case it took between 24-48 hours and in 2 (8.7%) case it took more than 48 hours.

In 15 (65.2%) cases the procedure took less than 2 hours to complete and in 8 (34.8%) cases it took 2-4 hours to complete.

Table-5: time taken to shift patients to the operating room after arrival

Time to OT	Number	Percentage
<6 hours	14	60.8
6-24 hours	6	26
24-48 hours	1	4.3
>48 hours	2	8.7

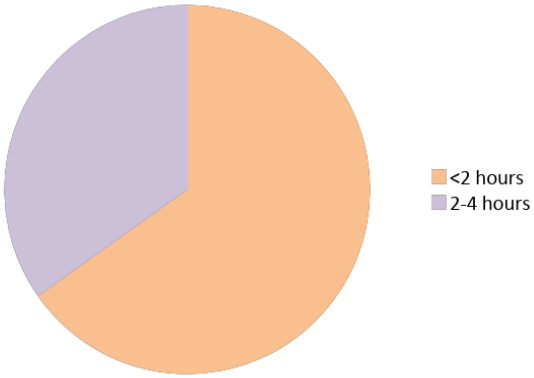

Fig-5: Pie chart showing procedure times in the patients operated for trauma

Intra operative findings were as follows:

Splenic lacerations in 9 (39.1%) cases and small bowel tears in 5 (21.7%) cases. Mesenteric tears in 4 (17.3%) cases and small bowel perforation in 2 (8.7%) cases. Complete transaction of jejunum in 1 (4.3%) case and liver lacerations in 2 (8.7%) cases.

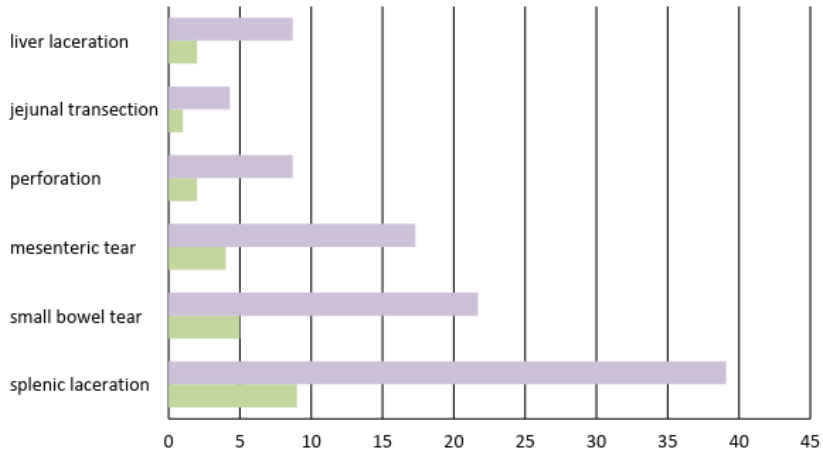

Fig-6: Bar diagrammatic representation of intra operative findings amongst operated patients

In the following post-operative period it was seen that 1(4.3%) patient recovered with complications and 1 (4.3%) expired whereas 21 (91.4%) patients made a complete recovery.

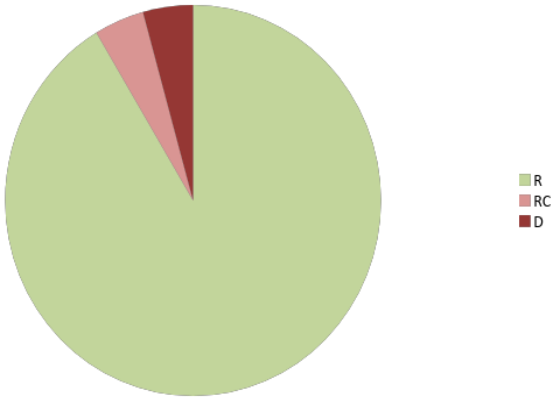

Fig-7: Pie diagram showing the post-operative recovery/ recovery with complicationand death

DISCUSSION

All cases included in the study were received by the casualty emergency response team and were adequately resuscitated. Case management and decision making was under the guidance of a team of consultant surgeons, anesthetists and radiologists.

It was observed that most cases presenting with a history of trauma to the abdomen were of the age group of 20-29 years (26%). The patient that expired was a 45 year old male and the patient that recovered with complications was a 42 year old female. It was noted that of the patients handled the distribution was predominantly male (91.3%). Most cases that suffered a trauma to the abdomen stated the cause to be a road traffic accident and both cases of penetrating trauma were due to stab injuries.

It was seen that the mode of injury was predominantly (91.3%) a blunt trauma force. Of the cases that recovered with complication and those that expired all were found to be from this category whereas the two cases of penetrating trauma were managed successfully and made complete recovery.

A major share (69.5%) of the study group were able to reach hospital services within 6 hours of the incident. This was seen despite the fact that a majority of these patients belonged to a rural background. This could be attributed to increasing awareness and also to the concern of bystanders due to an event such as a road traffic accident. It was seen that those who could not make a full recovery were brought to hospital well beyond the mark of 48 hours, one being brought in 14 days after the incident and suffered an outcome of expiry and the other being brought in 10 days after the incident thus recovering with complications.

Vitals were highly unstable in the patient that expired during the time of admission and it was seen that features of shock had set in. features of hypovolemia and shock were also observed in 4 other patients and they fully recovered on intervention. In all 23 cases, a history of trauma was narrated by the

patients themselves or an attender. The most consistent complaint was that of dull aching abdominal pain.

Renal function tests and electrolyte values attained from all patients on admission returned values within a normal range except for 1(4.3%) case and recovery with complication was noted. Blood grouping and hemoglobin estimation was done for all patients immediately on arrival. Severely hypotensive patients with a falling level of consciousness unresponsive to a fluid challenge were opted to undergo investigation in the form of FAST and on the presence of free fluid were immediately shifted to operating room for further management.

On examination features of peritonitis were noted in 5 (21.7%) patients and was a finding in the patient that expired and also the patient that recovered with complications.

CT was used to obtain a diagnosis before decision was taken for emergency laparotomy in 19 (82.6%) cases which is similar to amount of cases in which CT was used according various other emergency laparotomy audits [12].

Most of the cases were operated on CT findings consistent with splenic lacerations. No spleen sparing surgery was attempted and in all patients' spleen was completely removed and all these patients were vaccinated as seen convenient in the post-operative period. All cases made complete uncomplicated recovery with mean hospital stay of 6.5 days.

Both cases of penetrating trauma were managed successfully by primary resuscitation and investigation in the form of CT abdomen indicating damage to hollow viscus. Prompt surgical management was undertaken and the injury was seen to be in the form of jejunal tear in one case and perforation on another. Primary closure was performed in both instances with 3-0 vicryl and patients were allowed oral diet by the 4th post-operative day. Complete recovery was observed.

5 (21.7%) cases were operated under the diagnosis of hollow viscus injury due to blunt trauma to the abdomen. 2 cases amongst these arrived at 8 hours post incident. Another 2 being brought in 2 days and 4 days respectively after the event. The remaining 1 case was brought in 10 days after the traumatic event occurred. A concealed period of pathogenesis was noted in these patients with little symptoms of discomfort in the period immediately following the traumatic event and this may be responsible for their delayed presentation. Surprisingly features of peritonitis were only noted in the case brought in after significant delay which also resulted in a post-operative complication after noting gangrenous bowel and peritonitis intra operatively and repair in the form of resection with proximal ileostomy.

Jejunal tears were seen in 2 cases and an ileal tear in 1 case which were repaired primarily with 3-0 vicryl and managed successfully. A completer jejunal transaction was noted in one case where both the patient arrival to the hospital and management were swift cuminating in a double layered anastomosis performed with 2-0 vicryl ensuring complete recovery. Patients were allowed oral diet by the 4th post-operative day in cases of bowel repair and on the 1st post-operative day in case of ileostomy.

2 cases were operated for an indication of liver laceration where in 1 case a swift decision was made based on CT scan and thus resulted in haemostasis and pressure packing followed by use of AbGel® to control bleeding. Another case was managed with a hesitant approach to surgery after a trial of conservative management for 48 hours during which the patients vitals remained stable following which a multidisciplinary decision was made to operate based on the patient's age and taken into account the risk of clot dislodgement. A 1 cm liver laceration was noted with no clot or free fluid intra operatively resulting in a negative laparotomy and the patient recovered from the procedure with no complication.

4 cases were operated under the impression of hemoperitoneum, a diagnosis obtained on FAST in 3 cases and CT abdomen in 1 case. Of these 1 case was brought in well over 2 weeks following an event of trauma which had features of shock on admission and was immediately managed in the form of FAST followed by operative management which revealed a frank pyoperitoneum with jejuna perforation. The perforation was closed with a proximal ileostomy performed and with adequate drain placement. The patient expired on the 3rd post-operative day. 2 cases amongst these had mesenteric tears which were sutured with 2-0 silk and haemostasis was secured following which viability of the bowel was ensured. 1 case had a jejuna tear with leak of bowel contents which was managed with a thorough peritoneal toilet followed by drain placement with primary repair using 3-0 vicryl. All cases were managed successfully and had a complete recovery.

21 (91.4%) of cases were successfully managed with morbidity noted in 1 (4.3%) case and mortality noted in 1 (4.3%) case. The mortality report according to various audits [12] was noted to be of the range 3-15% in cases of trauma to the abdomen.

CONCLUSION

Historically trauma to the abdomen has always held grave prognosis but with the development in health

care, team management and prompt diagnosis, resuscitation and decision making it has been observed that virtually all cases of this category can be managed with a striking success rate provided the patient is brought into the attention of medical services within an agreeable time period.

REFERENCES

1. Malhotra AK, Ivatury RR, Latifi R. Blunt abdominal trauma: evaluation and indications for laparotomy. Scandinavian journal of surgery. 2002 Mar;91(1):52-7.
2. Acute Abdomen. Role of CT in Trauma Stephen Ledbetter and Robin Smithuis, Department of Radiology of the Brigham and Women's Hospital, Boston and the Rijnland Hospital in Leiderdorp, the Netherlands. August 2nd 2007.
3. Nance ML. Abdominal Trauma. Fund of Ped Surg. 2011; 135-143.
4. Shaftan GW. Indications for operations in abdominal trauma. Am J Surg. 1960; 99, 657-64.
5. Demetriades D, Rabinowitz B. Indications for operations in abdominal stab wounds. A prospective study of 651 patients. Ann Surg. 1987; 205, 129-32.
6. Dang C. The Polytraumatized Patient: Secondary Survey. Last Accessed July 11, 2013. http://emedicine.medscape.com/article/1270888-overview#aw2aab6b5
7. Al-Temimi MH, Griffee M, Enniss TM, Preston R, Vargo D, Overton S, Kimball E, Barton R, Nirula R. When is death inevitable after emergency laparotomy? Analysis of the American College of Surgeons National Surgical Quality Improvement Program database. Journal of the American College of Surgeons. 2012 Oct 1;215(4):503-11.
8. Saunders DI, Murray D, Pichel AC, Varley S, Peden CJ. Variations in mortality after emergency laparotomy: the first report of the UK Emergency Laparotomy Network. Br J Anaesth. 2012; 109: 368–375.
9. Huddart S, Peden C, Quiney N. Emergency major abdominal surgery – 'the times they are a-changing'.Colorectal Dis. 2013; 15: 645–649.
10. Bergenfelz A, Søreide K. Improving outcomes in emergency surgery. Br J Surg 2014; 101: e1–e2.
11. Stoneham M, Murray D, Foss N. Emergency surgery: the big three – abdominal aortic aneurysm, laparotomy and hip fracture. Anaesthesia. 2014; 69: 70–80.
12. First patient report of the National Emergency Laparotomy Audit RCo a London, 2015 Thal ER. 1990. "Abdominal trauma". The surgical clinics of North America, W.B. Saunders Co. 70: 517-575.