e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(9); 1006-1020

Original Research Article

A Clinical Study on Blunt Abdominal Trauma in Emergency Medicine Department with Special Reference to Role of Fast

Roshmi Rekha Gogoi[1], Dipak Kumar Sarma[2]

[1]Assistant Professor, Department of Emergency Medicine, Nagaon Medical College, Mohkuli, Nagaon, Assam- 782003

[2]Professor & Head, Department of Emergency Medicine, Gauhati Medical College and Hospital

Received: 28-06-2023 / Revised: 25-07-2023 / Accepted: 29-08-2023

Corresponding author: Dr. Dipak Kumar Sarma

Conflict of interest: Nil

Abstract:

Introduction: Trauma, or injury, is defined as cellular disruption caused by an environmental energy that is beyond the body's resilience[1]. Trauma is the leading cause of death between the ages of 1 and 44 years. Blunt abdominal trauma (BAT) is injury to intra-abdominal or retroperitoneal viscera as a result of a non- penetrating force. It is commonly due to rapid deceleration or acceleration in combination with shearing and rotational forces [4,5]. Abdominal injuries occur in approximately 1% of all trauma patients.

Aims & Objectives: To study the clinical presentation and management of blunt abdominal trauma patients attending the Emergency Medicine department and to assess the role of Fast.

Materials and Methods: The Study was a Prospective observational study carried out during a period of one year from July 2018 to June 2019 in dept of Emergency Medicine Gauhati Medical College & Hospital.

Results and Observations: The distribution of age ranged from 18 to 82 years and mean age was 33.7 ± 13.43 years. Majority of cases 95 (42%) were found in the age group 18 to 27 years. The next majority (28%) were in the age group 28-37 years, 63 cases. The least common (1%) were in the age group of 77 and above years. Out of 226 cases of BAT, larger number of cases were observed in males 185 (82%) than in females 41 (18%).FAST was done in all 226 patients with BAT. FAST was positive in 114 (50.4%) cases and negative in 112 (49.6%) cases.

Conclusion: In patients with intra-abdominal injuries, majority were males and of young age group. Most of them presented on the same day with pain abdomen as the common presenting complain. Most of the cases were due to road traffic accidents and were commonly associated with orthopaedic injuries. FAST was found to be highly useful test and most FAST positive patients needed surgery.

Introduction

Trauma, or injury, is defined as cellular disruption caused by an environmental energy that is beyond the body's resilience[1]. Trauma is the leading cause of death between the ages of 1 and 44 years [2]. It has become an "Unsolved epidemic" in modern society and estimated loss of life equals to cardiovascular disease and cancer combined and is leading cause of death in patients younger than 40 years[3].

Blunt abdominal trauma (BAT) is injury to intra-abdominal or retroperitoneal viscera as a result of a non- penetrating force. It is commonly due to rapid deceleration or acceleration in combination with shearing and rotational forces [4,5]. Abdominal injuries occur in approximately 1% of all trauma patients[6]. They alone are responsible for 10% of total trauma caused mortality[7]. Abdominal injuries require surgery in about 25% of cases. 85% of abdominal traumas are of blunt character[8] . The incidence of blunt abdominal trauma is reported to be as high as 12-15% worldwide, with vehicular accidents being the leading cause in about 80% of the cases[9]. The mechanisms resulting in BAT were motor vehicle collision (73%), motorcycle collision (7%), auto-pedestrian collision (6%), and fall (6%).

Clinical examination and focused abdominal ultrasonography comprise(FAST) the standard initial abdominal evaluation in post trauma patients. Rapid diagnosis of abdominal injury is an important step in the treatment process to prevent morbidity or mortality in BAT cases. Rapid determination of cases in need of emergency surgery is crucial for life saving, especially for those with unstable

hemodynamic, the avoidance of unnecessary surgeries with its invasiveness and complications should be considered. Nowadays, focussed assessment in sonography for trauma is performed by emergency physicians. Large number of patients with Blunt trauma abdomen alone or in association with polytrauma is a frequent presentation in our emergency department. High index of suspicion and clinical acumen is required during evaluation of blunt abdominal injuries because physical signs and symptoms indicating presence of visceral lesions may poorly correlate with clinical presentation

Aims and Objectives

To study the clinical presentation and management of blunt abdominal trauma patients attending the Emergency Medicine department and to assess the role of FAST in clinical evaluation, diagnosis and management of BAT patients in Emergency Medicine Department.

Materials and Methods

The Study was a Prospective observational study carried out during a period of one year from July 2018 to June 2019. Patients with blunt abdominal trauma coming to the Department of Emergency Medicine, GMCH, aged more than 18 years were included. Pregnant patients, patients who left in between the treatment and those who were operated or treated in intensive care units in hospitals other than GMCH were excluded. All blunt abdominal trauma patients were examined with USG machine [ECUBE- 7(alpinion medical services)] available in the emergency department, Gauhati medical college and hospital in the USG room. A phased-array or curvilinear 2.5–5.0 MHz probe was used for the FAST exam. The views and windows used in the exam obtained with a single probe. Patients were examined in supine position mostly but for left upper quadrant examination, additional lateral position was used.

Results and Observations

The present study was carried out in the Department of Emergency Medicine of Gauhati Medical College and Hospital, Assam during a one year period from July, 2018 to June, 2019 where a total of 226 cases of blunt abdominal trauma were enrolled. The results obtained in this study were collected, analysed and observed according to age, sex, mode of injury, time of presentation, type of visceral injury, FAST, CT Scan findings, type of management and outcome.

Their ages ranged from 18 to 82 years and mean age was 33.7 ± 13.43 years. Majority of cases 95 (42%) were found in the age group 18 to 27 years. The next majority (28%) were in the age group 28-37 years, 63 cases. The least common (1%) were in the age group of 77 and above years.

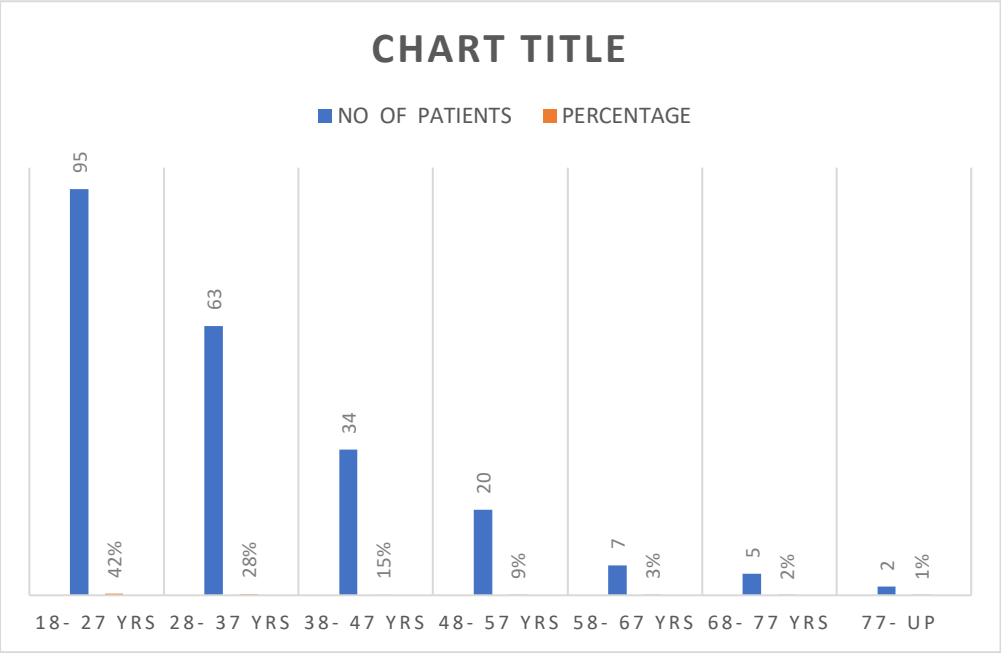

Figure 1: Bar Diagram Showing Age Wise Distribution of Cases

Out of 226 cases of BAT, larger number of cases were observed in males 185 (82%) than in females 41 (18%)

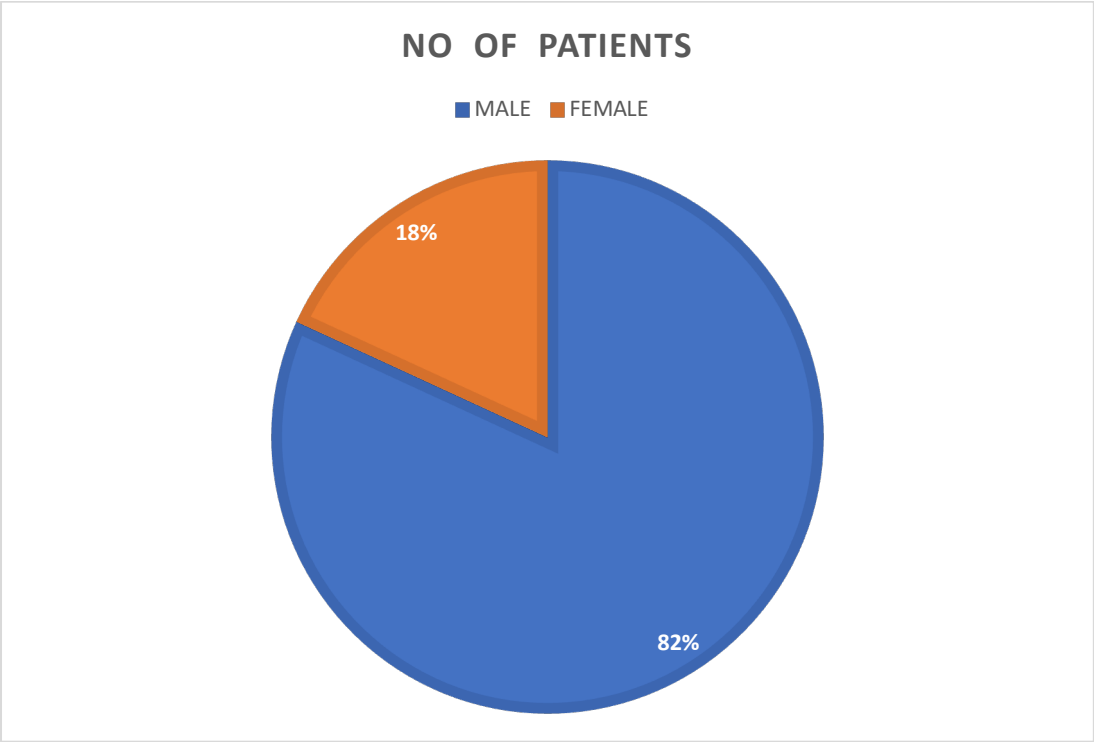

Figure 2: Pie Diagram Showing Gender Wise Distribution of Bat Cases

152 patients (67.3%) presented within the same day (67.3%), followed by 58 (25.7%) within 5 days and 16 (7%) after 5 days.

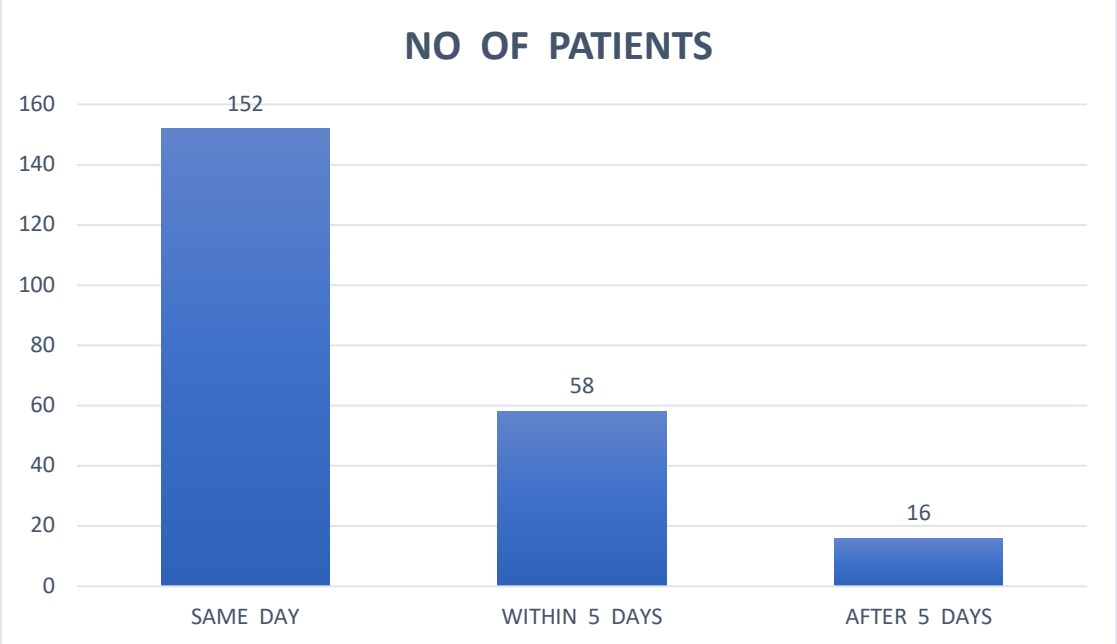

Figure 3:- Bar Diagram Showing the Time of Presentation of Bat Patients in Ed

Mode of injury was road traffic accident in 152 (67%) patients, fall from height in 38 (17%), physical assault in 18 (8%), hit by blunt objects in 7(3%) and other modes in 11 (5%) patients.

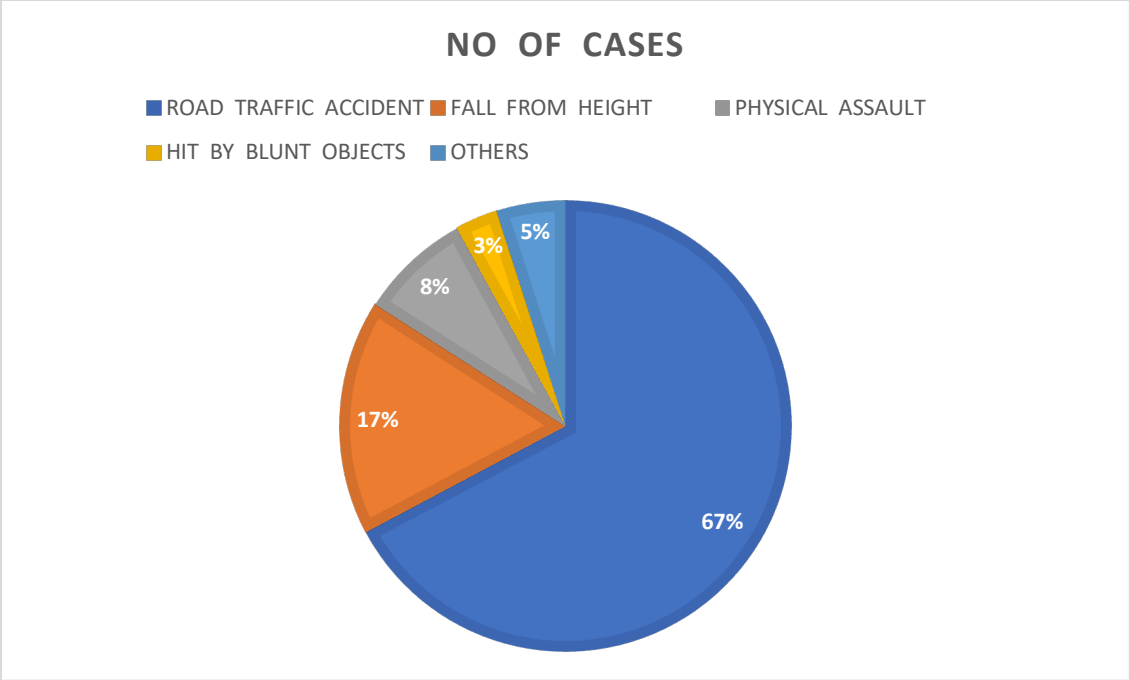

Figure 4: Pie Diagram Showing the Mode of Injury

It was seen that the presenting complaints of the patients were pain abdomen 212 (94%), vomiting 68 (30%), distention of abdomen 36 (16%), shock 100 (44.2%), urinary retention 18 (8%) and hematuria 9(4%).

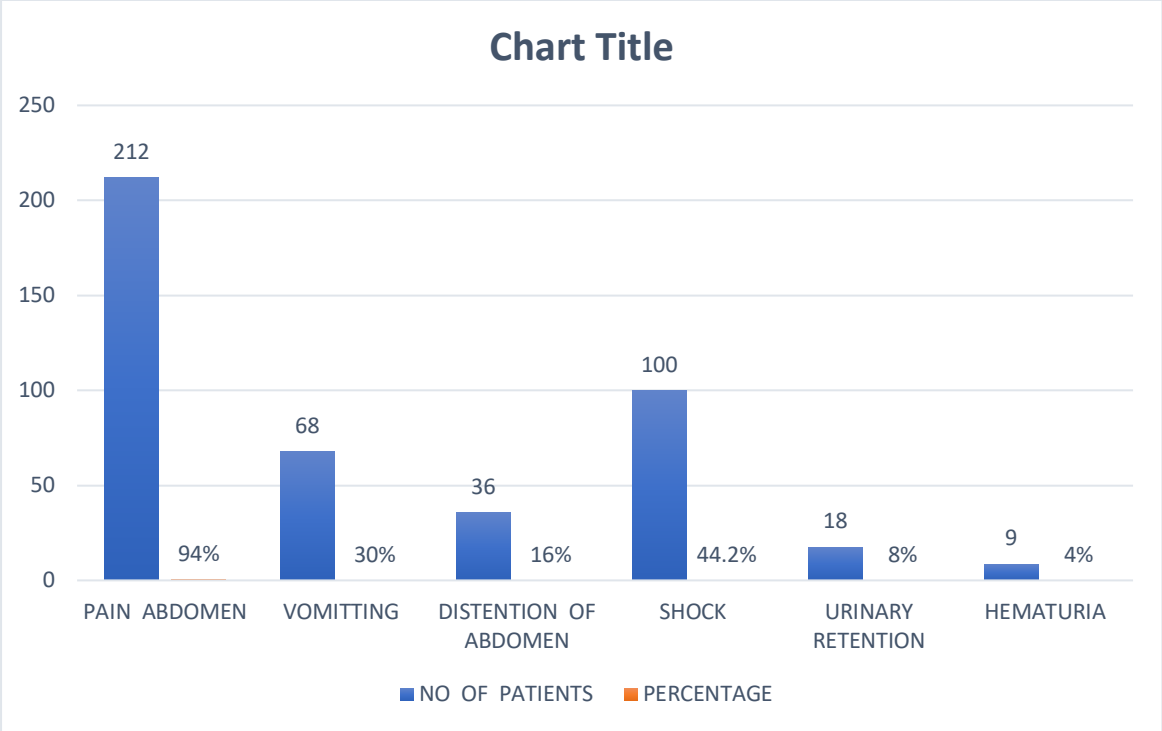

Figure 5: Bar Diagram Showing Clinical Presentation of the Cases

Associated extra-abdominal injuries were found in 118(52.2%) cases. The extra-abdominal injuries were head injuries 34 (15%), thorasic 16 (7%), orthopaedic 38 (17%), genitalia/perineal 7 (3%), soft tissue 23 (10%)

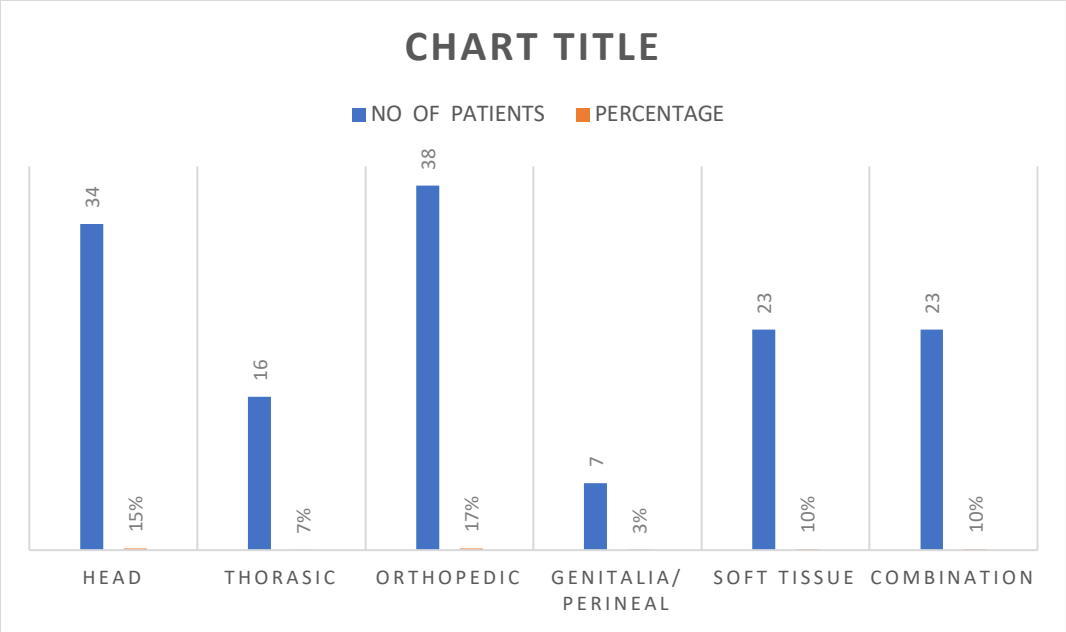

Figure 6: Bar Diagram Showing Distribution of Associated Extra Abdominal Injuries

Out of the 226 patients with BAT, 126 (55.8%) patients were hemodynamically stable whereas 100 (44.2%) patients were unstable.

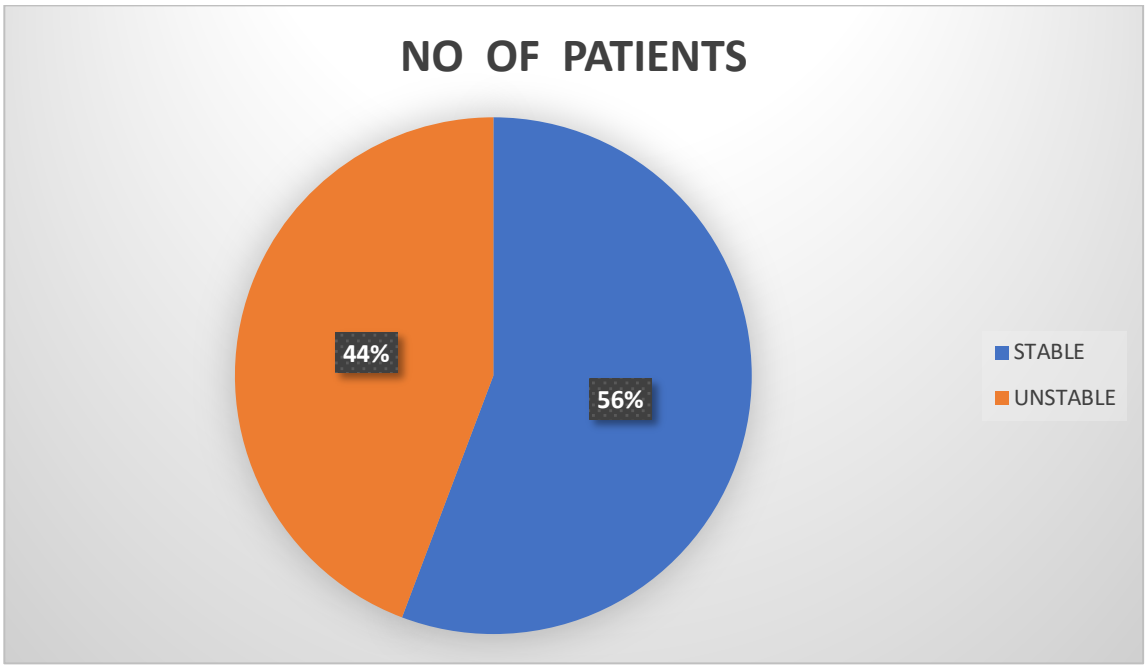

Figure 7: Pie Diagram Showing the Hemodynamic Status

Fast Findings

FAST was done in all 226 patients with BAT. FAST was positive in 114 (50.4%) cases and negative in 112 (49.6%) cases.

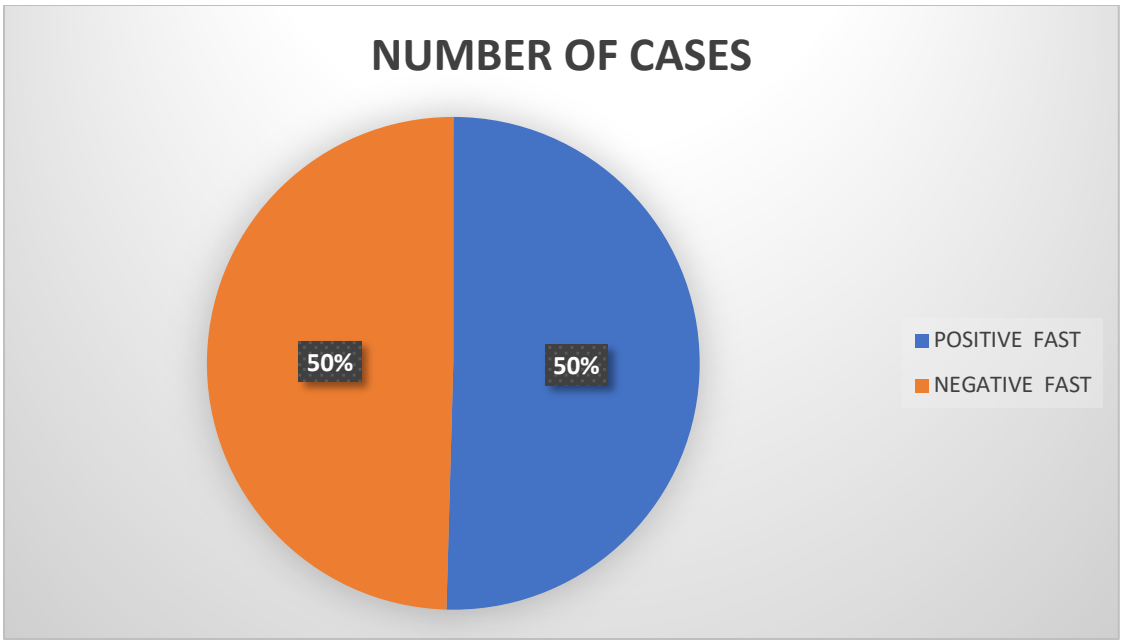

Figure 8: Pie Diagram Showing the Fast Findings

Out of the 126 hemodynamically stable patients, FAST was positive in 23 (18.3%) cases and negative in 103 (81.7%) cases, whereas out of the 100 hemodynamically unstable patients, FAST was positive in 91 (91%) and negative in 9 (9%) cases. The values are statistically significant ($p<0.05$) when comparing the above two groups.

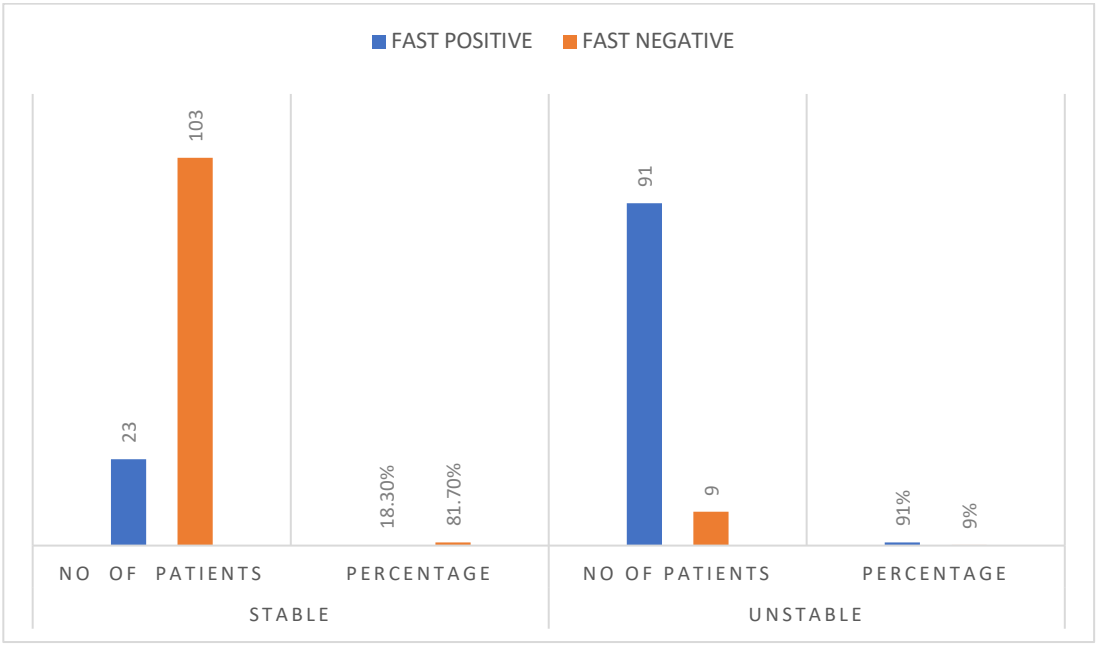

Figure 9: Bar Diagram Showing the Fast Findings in Hemodynamically Stable And Unstable Patients

Out of the 226 patients, CT scan abdomen was done in 53 cases only that were hemodynamically stable. Out of 53(23.4%) patients in which CT scan abdomen was done, CT scan abdomen was positive in 47(88.6%) patients and negative in 3(5.7%) patients. In the same CT positive patients, FAST was positive in 20 patients, and negative in 27 patients. In the CT negative patients, FAST was positive in 3 and negative in 3 cases. The values are not statistically significant ($p>0.05$) when comparing the above two groups.

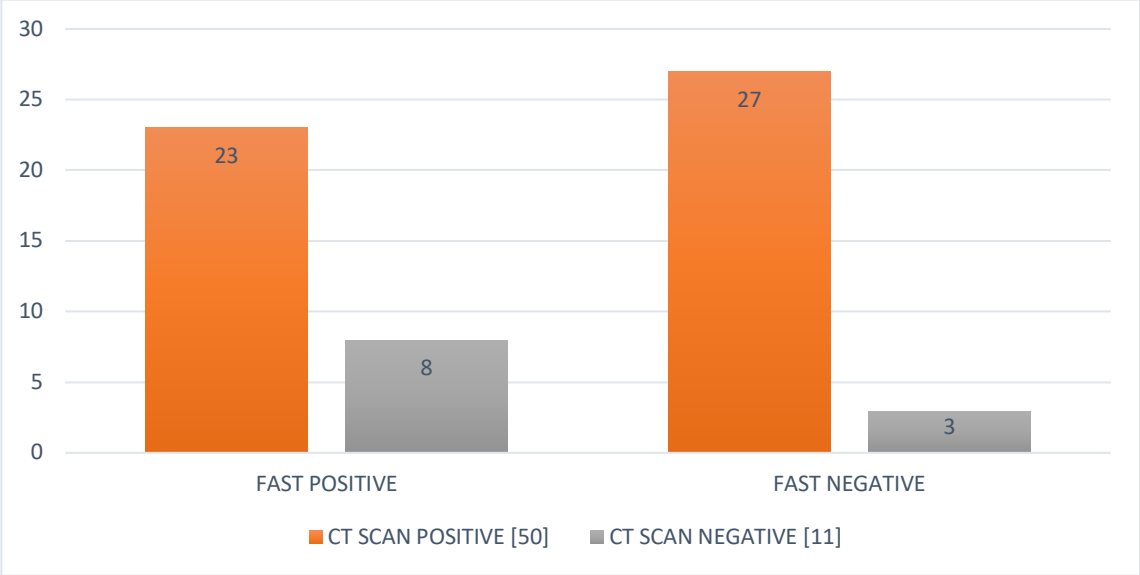

Figure 10: Bar Diagram Showing CT Scan Findings and Fast Findings

Out of 226 cases of BAT, 105 (46.4%) cases had conservative management and 121 (53.5%) cases had operative management.

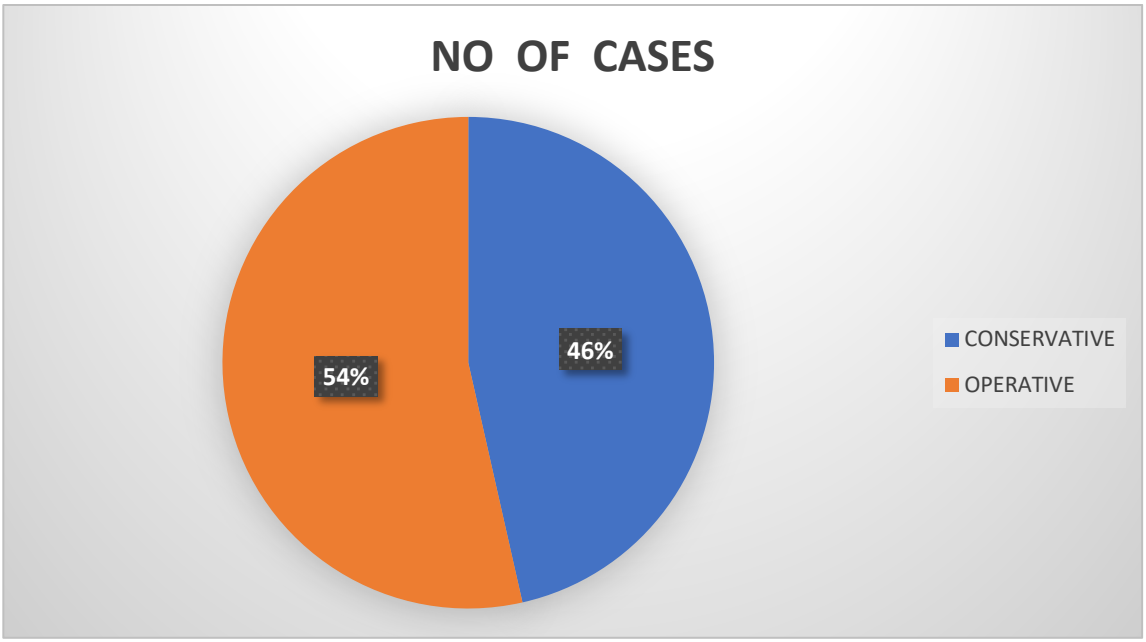

Figure 11: Pie Diagram Showing the Management of Bat

Patients

Out of the 133 patients with intra-abdominal injuries, the different organs involved were spleen in 44 (33.5%), liver 30(22.5%), small bowel 27(20.3%), stomach 6(4.5%), mesentery 4(3%), kidney 12(9%), bladder 7(5.2%), pancreas 1(0.7%), large bowel 6(4.5%) and multiple organ injuries in 5(3.7%) patients.

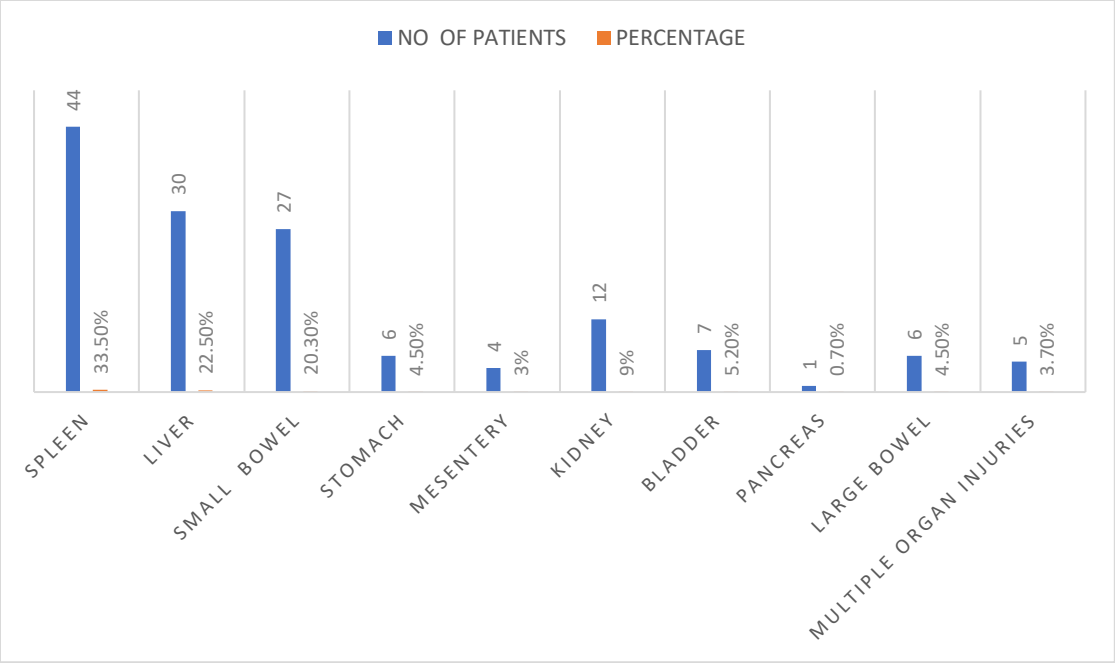

Figure 12: Figure Showing the Different Intra-Abdominal Organs Injured in Bat Patients as Per CT Scan Abdomen and Operative Findings

Out the 105 patients that underwent conservative management, FAST was positive in 14(13.3%) and negative in 91(86.7%) cases. Out of the 121 patients that underwent operative management, FAST was positive in 100 (82.6%) and negative in 21 (17.36%) cases. The values are statistically significant ($p<0.05$) when comparing the above two groups.

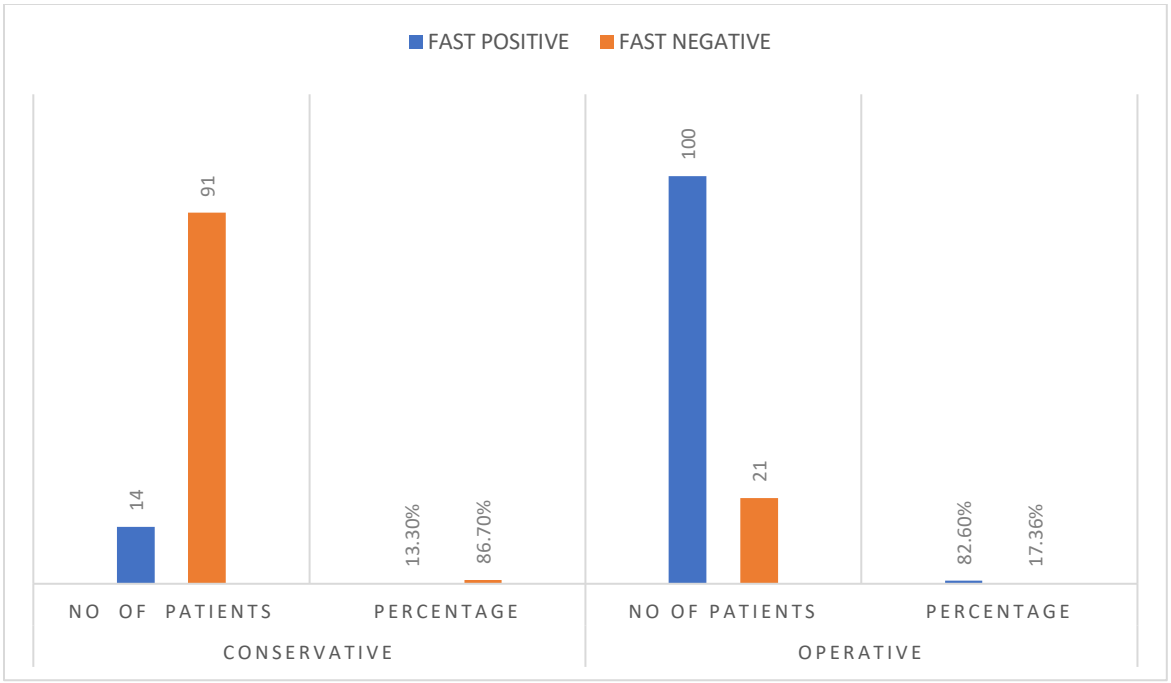

Figure 13: Fig Showing the Fast Findings in Patients with Conservative and Operative Management

Out of the 121 cases that underwent operative management, the type of operations that were done in these patients were nephrectomy in 12(9.1%), splenectomy in 44(36.4%), bladder repair in 7(5.8%), liver laceration repair in

24(19.8%), gastric repair in 6(4.9%), mesenteric repair in 3(2.5%), bowel perforation taken as loop ileostomy in 23(19%) and simple closure of bowel perforation in 7(5.8%). (5 patients had combined injuries)

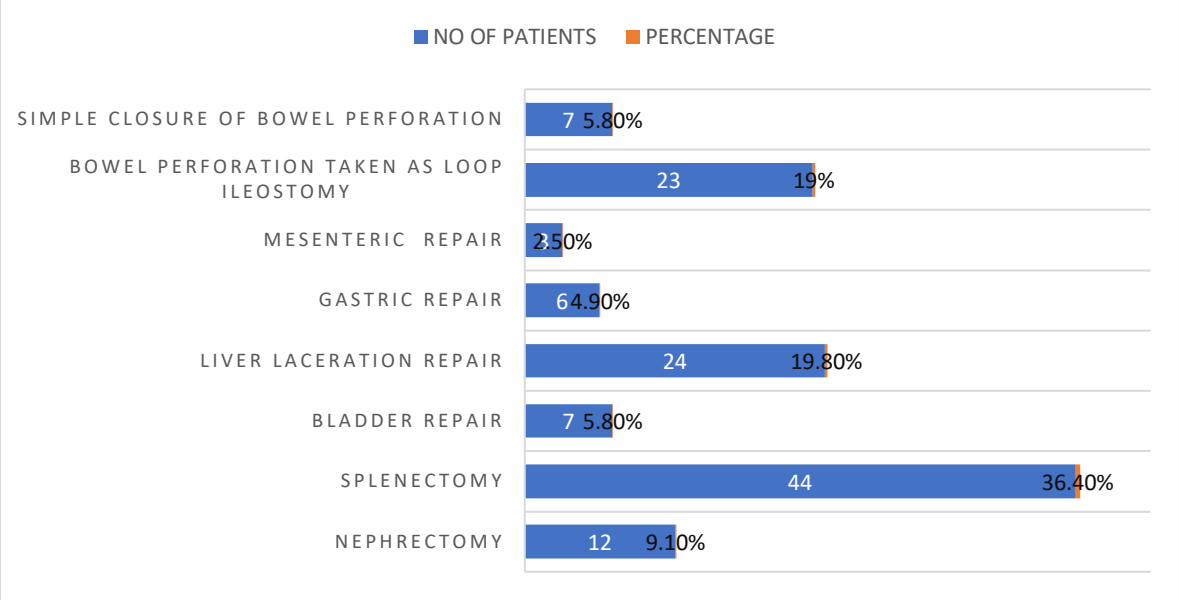

Figure 14: Bar Diagram Showing the Type of Operative Management Done in Bat Patients

Out of the 226 patients, 87 had solid organ injuries and 46 had hollow viscus injury and. Out of the 46 patients with hollow viscus injury, FAST was positive in 26 (56.5%) patients and negative in 20 (43.5%) patients. Out of the 87 patients with solid organ injuries, FAST was positive in 80 (92%) and negative in 7 (8%) patients. The values are statistically significant ($p<0.05$) when comparing the above two groups.

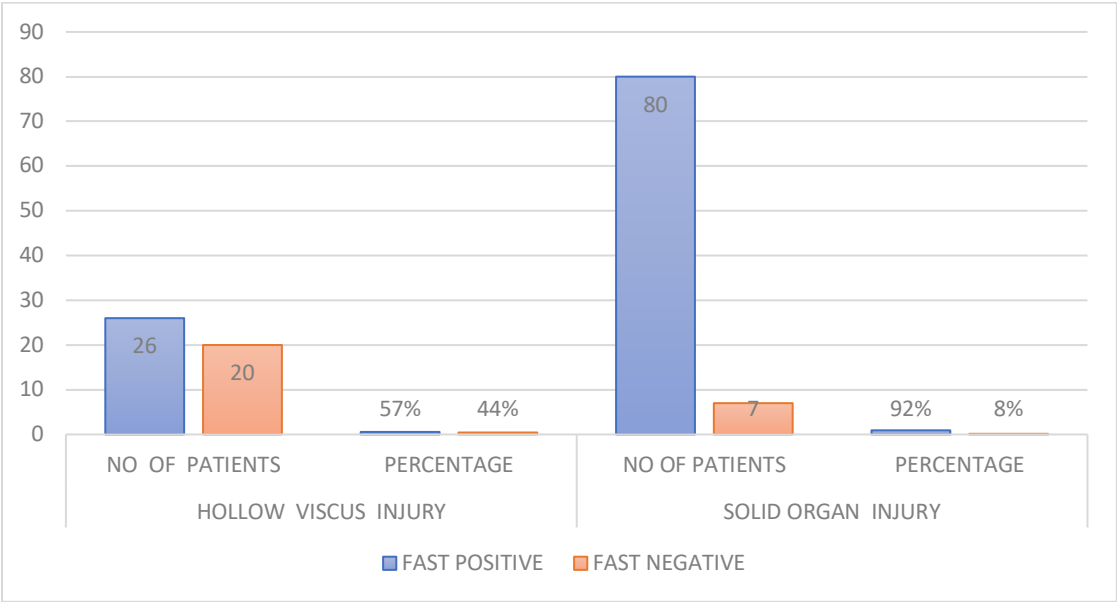

Figure 15: Fig Showing Fast Findings in Different Types of Organ Injury as Per CT Scan and Operative Findings

Out of 90 patients with solid organ injury, there were 44 patients with injury of the spleen, FAST was positive in 42(95.5%) and negative in 2(4.5%) cases. In 30 liver injury patients, FAST was positive in 28(93.3%) and negative in 2(6.7%) cases. In 12 kidney injury patients, FAST was positive in

10(83.3%) and negative in 2(16.7%) cases. Lastly, FAST was negative in 1 (100%) case of pancreatic injury. The values are statistically significant ($p<0.05$) when comparing the above two groups.

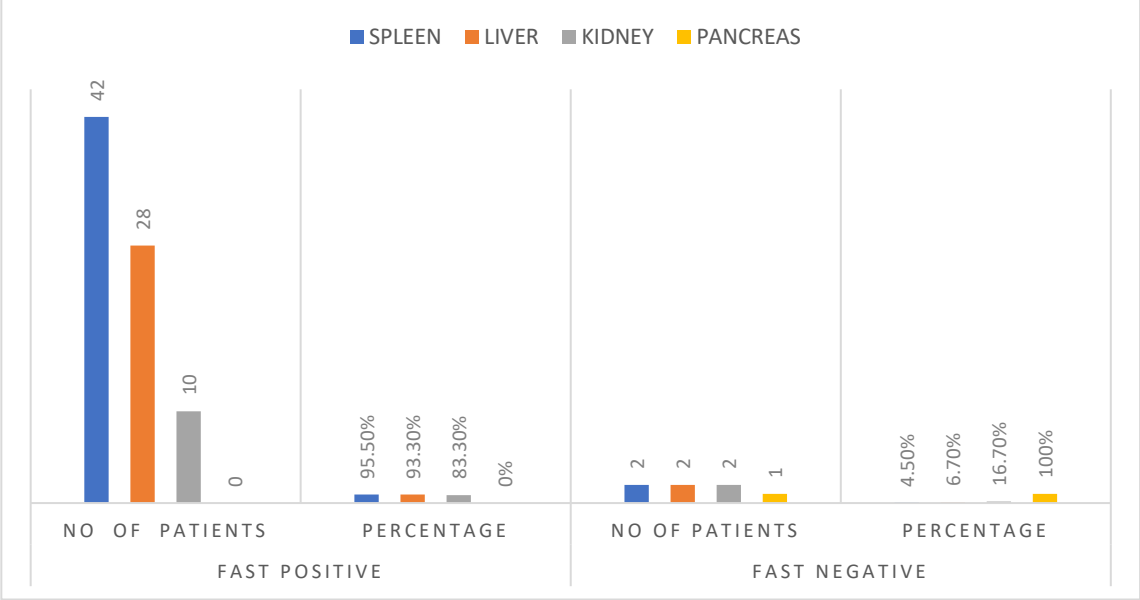

Figure 16: Fig Showing Fast Findings in Different Type of Solid Organ Injury as Per CT Scan and Operative Findings

Out of the 226 blunt abdominal trauma patients, intra-abdominal injuries were found in 133 (59%). In 93 (41%) cases intra-abdominal injuries were absent.

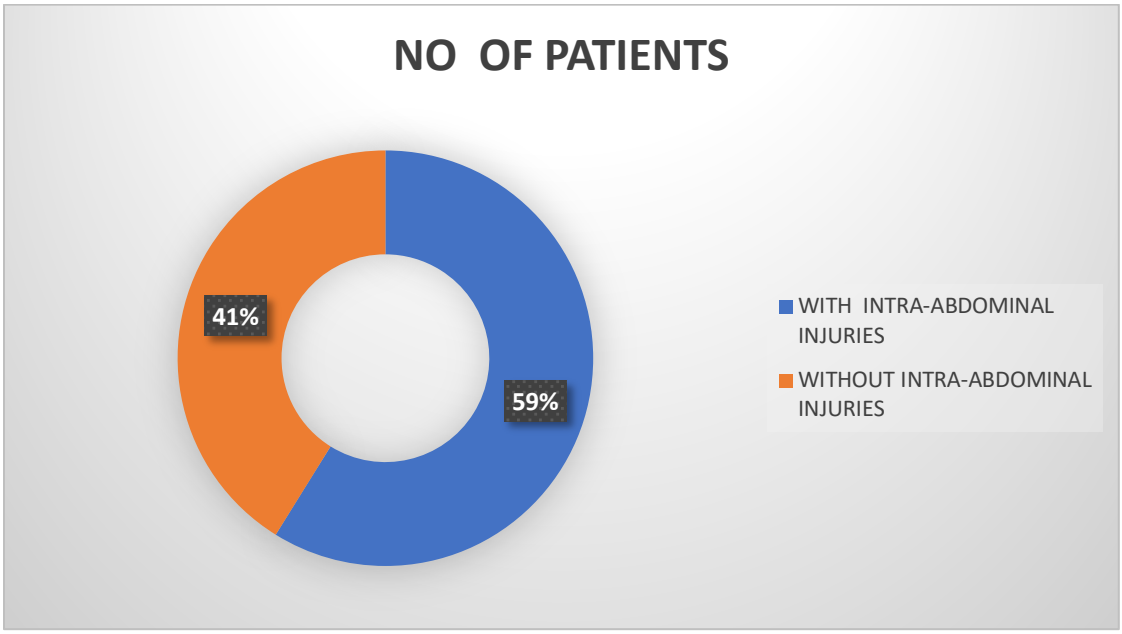

Figure 17: Pie Diagram Showing the Incidence of Intra - Abdominal Injuries in Blunt Abdominal Trauma Patients

FAST was done in all 226 patients, out of which FAST findings were true positive in 106(47%), true negative 85(37.6%), false positive 8(3.5%) and false negative in 27(11.9%) cases. The values are statistically significant($p<0.05$) when comparing the above two groups.

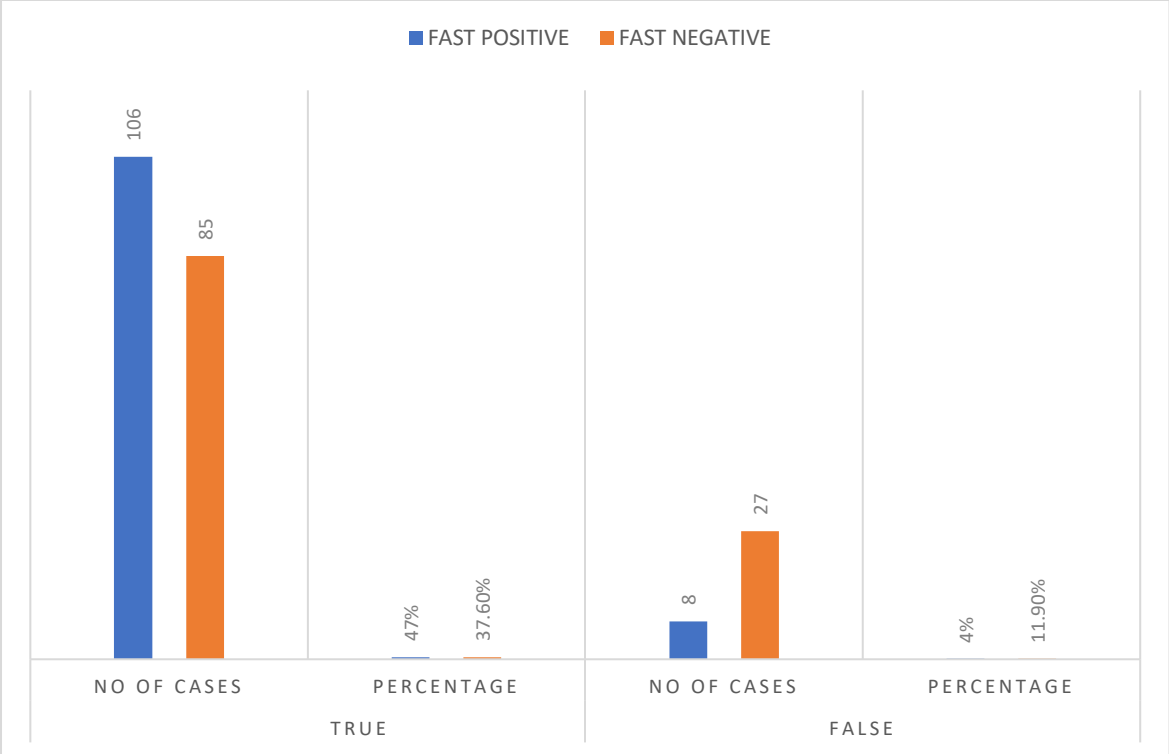

Figure 18: Fig Showing the Results of Fast Findings

In this study, it was found that the sensitivity of FAST was 79.7%, specificity was 91.4% and accuracy was 84.5%.

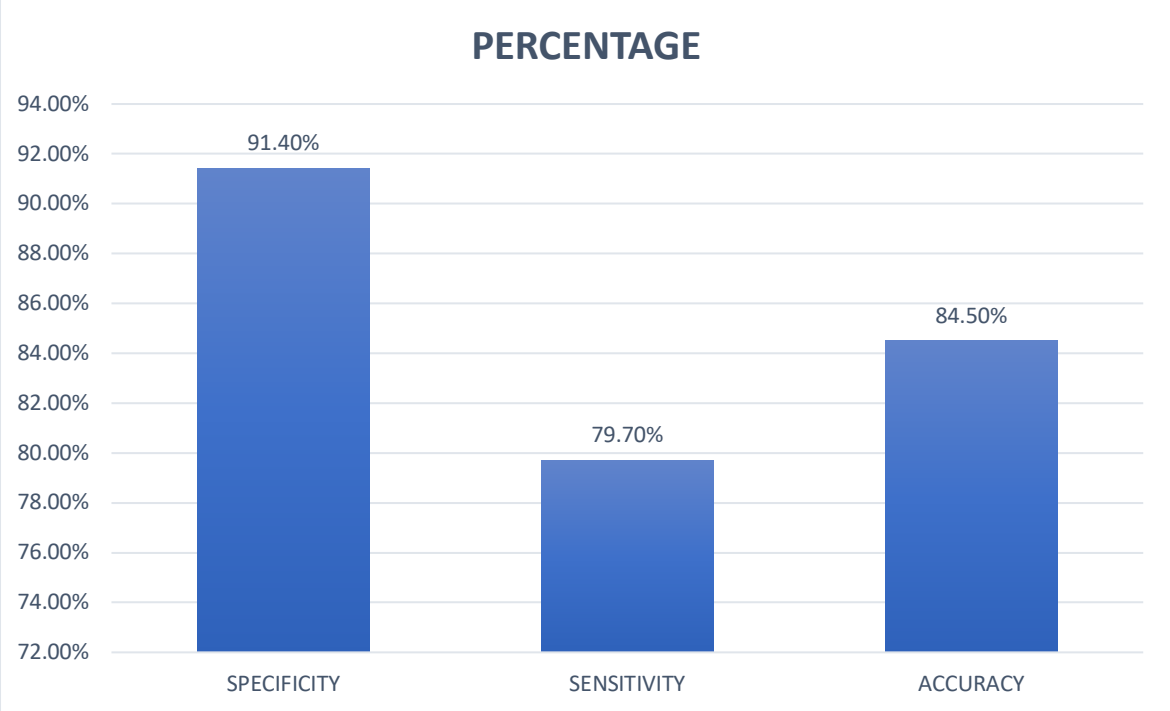

Figure 19: Fig Showing the Results of Fast

The duration of hospital stay was 0-5 days in 50(22%) cases, 6-10 days in 72(32%), 11-15 days in 50(22%), 16-20 days in 27(12%), more than 20 days in 27(12%) cases.

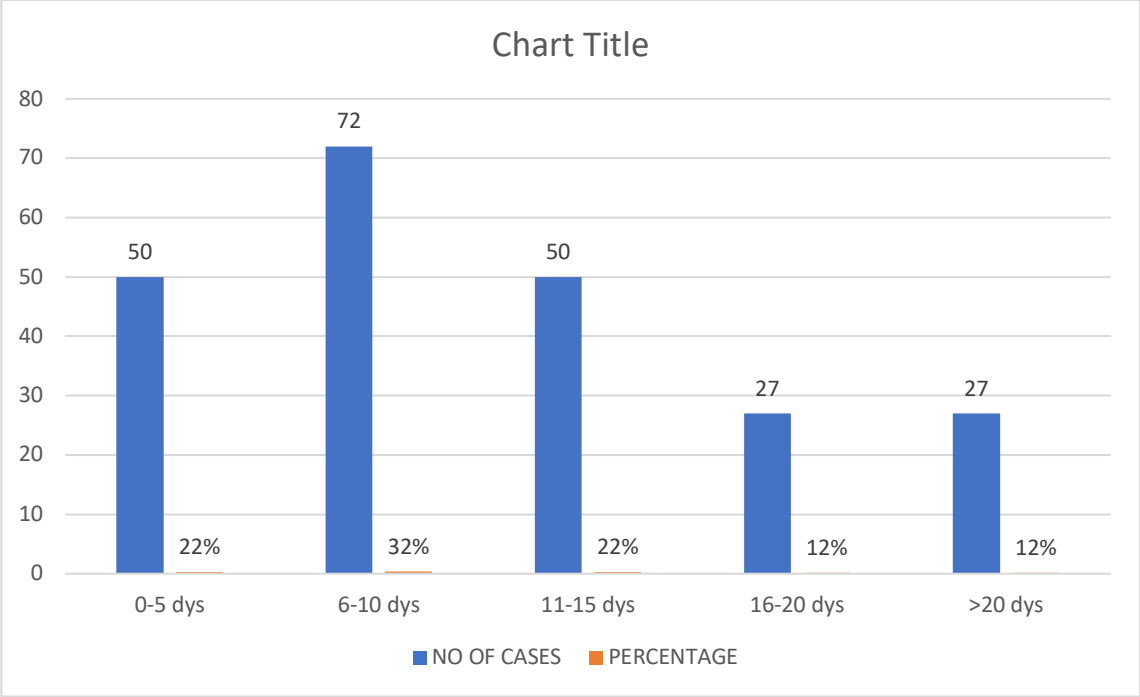

Figure 20: Fig Showing Duration of Hospital Stay in Bat Patients

The following table shows the post operative complications and their relative incidences in 27 patients out of 121, who underwent surgery. Wound dehiscence was found in 4(13%) cases, wound infection in 5(20%), fecal fistula in 2(7%), respiratory complication in 9(33%), intra-abdominal collection in 5(20%) and duodenal fistula in 2(7%) cases.

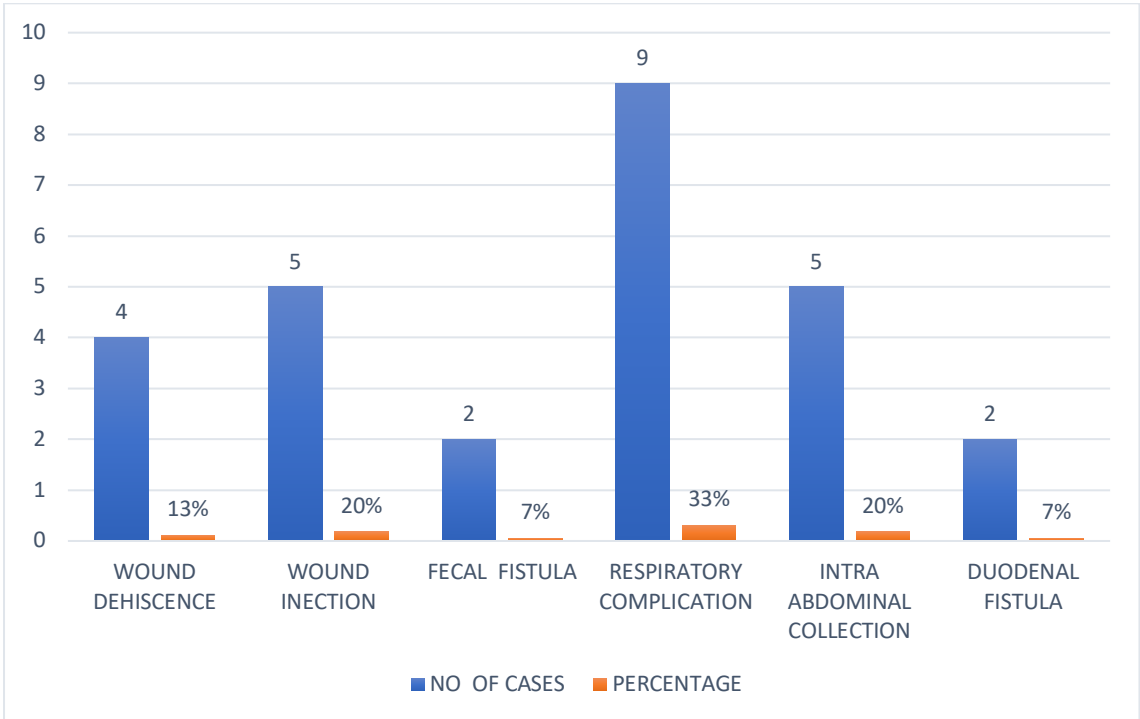

Figure 21: Fig Showing the Post Operative Complications in Patients That Underwent Surgery

Out of 226 patients attending emergency department with BAT, 11 (5 %) died and 215 (95%) survived.

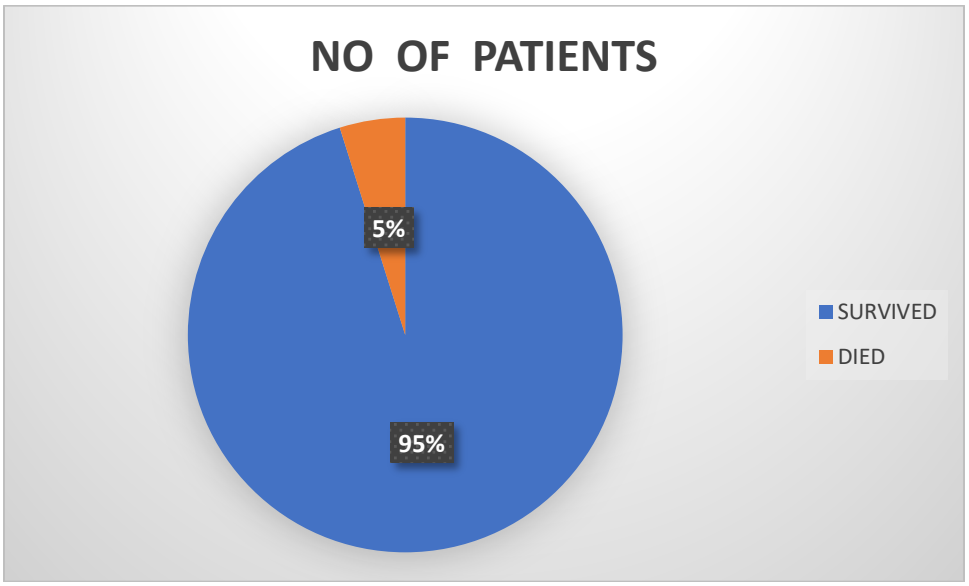

Figure 22: Fig Showing the Outcome in the Bat Patients

Out of 226 patients with BAT, 11 died. In these 11 patients, the cause of death was ARDS in 3 (32%) cases, cardiac arrest in 2 (15%) and septicaemia in 6 (53%) cases.

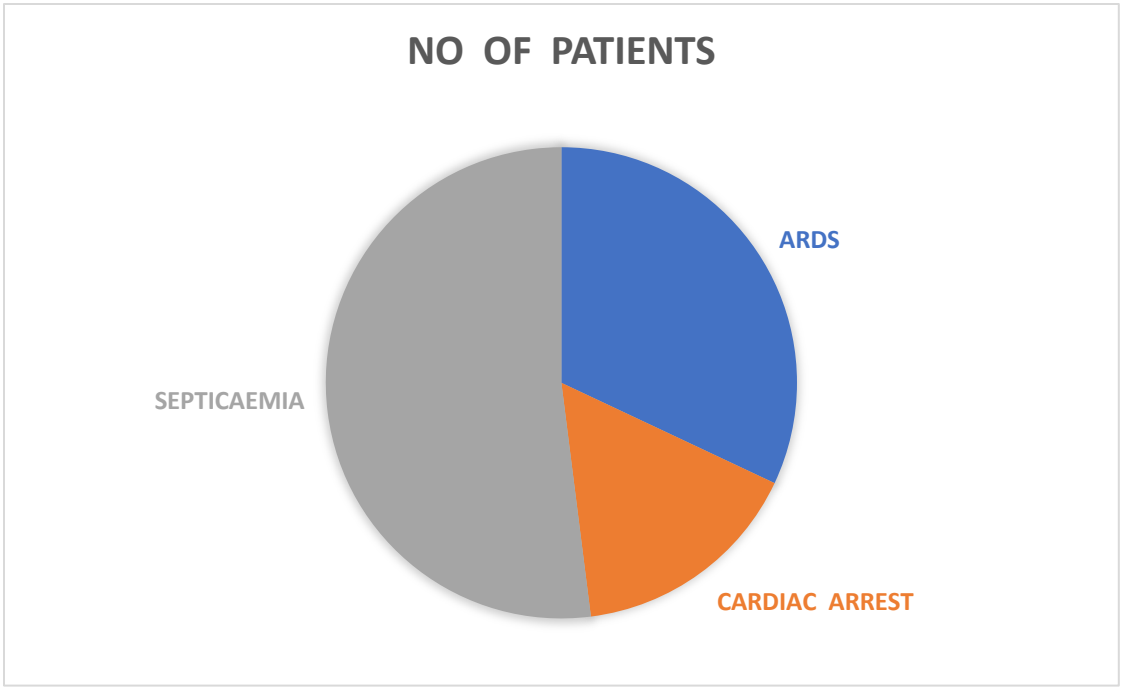

Figure 23: Fig Showing the Distribution of the Cause of Death

Discussion

Focussed Abdominal Sonography in Trauma is a popular screening tool in detecting free fluid in cases of blunt abdominal trauma. We have taken up this study to clinically evaluate the cases of blunt abdominal trauma coming to the emergency with special reference to role of FAST. In our study, majority of the patients belonged to the age group of 18 to 27 years, i.e 95 cases(42%).

The age range in the study was 18 to 82 years. The mean age was 33.7 years with a standard deviation of 13.43. Mean age in males was 33.67 ± 13.67 while

mean age in females was 33.85 ± 12.46. These data are well comparable to the observations made by others such as Huang MS et al, Kirkpatrick AW et al, Hemang A Panchal et al, Rahman S et al etc. The majority of the patients were male 185(82%) and whereas females were less in number 41(18%), thus making the male: female ratio of involvement as 4.5:1. It was comparable to J L Kumawat et al, Hemang A Panchal et al[10]. Road traffic accidents were the most common cause of blunt abdominal trauma, accounting for 152(67%) cases followed by fall from height 38(17%), physical assault 18(8%), hit by blunt objects 7(3%) and other mechanism 11(5%). Similar observations were also found in the studies conducted by Huang MS et al[11], George et al [12], Nikhil Mehta et al[13], Hemang A Panchali et al [10], J Amuthan et al (14) and Avinash kumar et al(20). Road traffic accidents were found to be the most common cause of blunt abdominal trauma in these studies.

In our study, we found that the most common presentation of blunt abdominal trauma patients was pain abdomen 212 (94%), followed by shock 100(44.2%), vomiting 68 (30%), distention of abdomen 36 (16%), urinary retention 18(8%) and hematuria 9(4%). Similar observations were also found in the study conducted by Nikhil Mehta et al[13] in 2014 and J Amuthan et al[14] in 2017. Presence of these signs and symptoms warrants immediate attention (prompt primary resuscitation and timely definitive treatment) in abdominal trauma patients [10]. FAST was done in all patients. In some studies, FAST was done selectively and not in all patients as in the studies by Ahmed Faruque et al[17] and Nataranjan et al[15] where total patients were 2980,18 patients had an inconclusive focused assessment with sonography for trauma, whereas 7 patients died on arrival, leaving 2,105 patients for analysis. There are varied results of FAST in different studies. Studies by Zoe A smith et al [16] and Ahmed F et al [17] showed few FAST positive cases relative to FAST negative results. In a study by Beat Schnuriger et al[18] in which they reported 181 FAST positive cases compared to 45 FAST negative cases, is comparable with our study where we got 114(50.4%) FAST positive cases and 112(49.6%) FAST negative cases. Out of the 126 hemodynamically stable patients, FAST was positive in 23 (18.3%) cases and negative in 103 (81.7%) cases, whereas out of the 100 hemodynamically unstable patients, FAST was positive in 91 (91%) and negative in 9 (9%) cases. The values are statistically significant ($p<0.05$) when comparing the above two groups. Similar findings were found in studies done by Jeffrey Carter et al (19) in 2010 and Nataranjan et al [15] in 2010. Jeffrey Carter et al [19] found FAST positive in 21.9% hemodynamically stable and in 28% hemodynamically unstable patients, while Nataranjan et al.[15] found 41% and 79.5% respectively. They reported that in hemodynamically stable patients, a negative FAST without a CT may result in missed intra-abdominal injuries. In hemodynamically unstable blunt trauma patients, with clear physical findings on examination, the decision for exploratory laparotomy should not be distracted by a negative FAST [19].

Conclusion

Our present study reflects the clinical presentation and importance of FAST examination in blunt abdominal trauma patients attending the emergency department. In patients with intra-abdominal injuries, majority were males and of young age group. Most of them presented on the same day with pain abdomen as the common presenting complain. Most of the cases were due to road traffic accidents and were commonly associated with orthopedic injuries. Most of the hemodynamically unstable and operated patients were FAST positive. Operative management was needed in most of the FAST positive cases. Solid organ injuries were more in BAT and FAST was more sensitive in detecting solid organ injuries. Spleen was commonly involved solid organ. FAST was less sensitive in detecting hollow viscus injuries. Sensitivity, specificity and accuracy were found to be high. Post operative complications occurred in few patients. Out of them few died because of septicaemia

This study was a single center study involving lesser number of patients during a smaller time period of one year. A multicentric study involving multiple trauma centres with large number of patients are required for better understanding of the role of FAST

References

1. Cothren CC, Biffl WL. and Ernest E. Moore. Schwartz's Principles of Surgery. 2009 Sep 11: 135.
2. Billiar T, Andersen D, Hunter J, Brunicardi F, Dunn D, Pollock RE, Matthews J. Schwartz's principles of surgery. McGraw-Hill Professional; 2009.
3. Suman S, Babita, Singh G.N . Study on Abdominal Trauma Patients Comparatively by Ultrasonography and CT, IJCMR. 2017:4(4).
4. Davis JJ, Cohn Jr IS, Nance FC. Diagnosis and management of blunt abdominal trauma. Annals of surgery. 1976 Jun;183(6):p-672.
5. Wilson WC, Grande CM, Hoyt DB, editors. Trauma: critical care. CRC Press; 2007 Feb 5.
6. McKenney KL, Nuñez DB, McKenney MG,

Asher J, Zelnick K, Shipshak D. Sonography as the primary screening technique for blunt abdominal trauma: Experience with 899 patients. Am J Roentgenol. 1998;170(4):979-85.
7. Gupta S, Talwar S, Sharma RK, Gupta P, Goyal A, Prasad P. Blunt trauma abdomen: a study of 63 cases. Indian J Med Sci. 1996;50(8):272-6.
8. Ahmet K, Tongue Y. Blunt abdominal trauma: evaluation of diagnostic options and surgical outcomes. Turkish J Trauma Emerg Surg. 2008; 14:205-10.
9. Kendall JL, Kestler AM, Whitaker KT, Adkisson MM, Haukoos JS. Blunt abdominal trauma patients are at very low risk for intra-abdominal injury after emergency department observation. West J Emerg Med. 2010;12(4):496-504.
10. Panchal HA, Ramanuj AM. The study of abdominal trauma: patterns of injury, clinical presentation, organ involvement and associated injury. International Surgery Journal. 2016 Dec 9;3(3):1392-8.
11. Huang MS, Liu M, Wu JK et al. Ultrasonography for the evaluation of hemoperitoneum during resuscitation: a simple scoring system. J Trauma. 1994; 36:173–77
12. Radin R, Chan L, Demetriades D. Nonoperative treatment of blunt injury to solid abdominal organs: a prospective study. Archives of surgery. 2003 Aug 1;138(8):844-51.
13. Mehta N, Babu S, Venugopal K. An experience with blunt abdominal trauma: evaluation, management and outcome. Clinics and practice. 2014 Jun 18;4(2).
14. Amuthan J, Vijay A, Pradeep C, Anandan H. A clinical study of blunt injury abdomen in a tertiary care hospital. International Journal of Scientific Study. 2017 Apr 1;5(1):108-12.
15. Natarajan B, Gupta PK, Cemaj S, Sorensen M, Hatzoudis GI, Forse RA. FAST scan: is it worth doing in hemodynamically stable blunt trauma patients? Surgery. 2010 Oct 1;148(4):695-701.
16. Smith ZA, Postma N, Wood D. FAST scanning in the developing world emergency department. South African Medical Journal. 2010;100(2).
17. Faruque AV, Qazi SH, Khan MA, Akhtar W, Majeed A. Focused abdominal sonography for trauma (FAST) in blunt paediatric abdominal trauma. J Pak Med Assoc. 2013 Mar 1;63(3):361-4.
18. Schnüriger B, Kilz J, Inderbitzin D, Schafer M, Kickuth R, Luginbühl M, Candinas D, Exadaktylos AK, Zimmermann H. The accuracy of FAST in relation to grade of solid organ injuries: a retrospective analysis of 226 trauma patients with liver or splenic lesion. BMC medical imaging. 2009 Dec;9(1):3.
19. Carter JW, Falco MH, Chopko MS, Flynn Jr WJ, Wiles III CE, Guo WA. Do we really rely on fast for decision-making in the management of blunt abdominal trauma? Injury. 2015 May 1; 46(5):817-21.
20. Kumar A, Sharma S, Salim M. Spectrum and Outcome of Blunt Trauma Abdomen at Sardar Patel Medical College and PBM & Associate Group of Hospitals.