



An Observational Study On Management And Outcome Of Liver Trauma, Based On World Society Of Emergency Surgery (WSES) Guidelines In Rgggh

¹Dr. P. Prabhakar, ²Dr T.Suguanthan, ³Dr. R. Kannan

¹Assistant Professor, ²Post Graduate, ³Director,
Institute Of General Surgery, Madras Medical College And Rajiv Gandhi Government
General Hospital, Chennai

***Corresponding Author:**

Dr. P. Prabhakar

Assistant Professor, Institute Of General Surgery, Madras Medical College And Rajiv Gandhi
Government General Hospital, Chennai

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: Liver injuries are common in any high-volume trauma center. Our knowledge of its management has improved in the past three decades. Recent advances and minimally invasive techniques play a vital role in the conservative approach. It is very difficult for a trauma surgeon to control massive bleeding occurring in the liver following trauma. The bleeding structure is very tough to find out, and the crucial period to save the trauma victim before the onset of hypothermia, acidosis, and coagulopathy—the markers of an irreversible physiologic insult.

Aim& Objectives: To find the efficacy of WSES guidelines in classifying liver trauma and determining optimal treatment strategy. To study the clinical course of nonoperatively managed patients.

Materials & Methods: This Observational study (Prospective) was conducted in Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai from February 2018 to September 2019. All trauma victims sustain blunt and penetrating trauma to the liver with or without associated injuries. AAST grading system will be used to assess the anatomy of liver injury. WSES classification will be the standard methodology used to assess the severity of the liver injury. Management of liver injury will be based on WSES guidelines. Patients managed conservatively will be followed up prospectively and till discharge or death. Serial Abdominal examination. Time of reinitiating oral intake. Duration and intensity of restricted activity, Conclusions will be drawn based on the above parameters and all efforts to decide the effectiveness of WSES guidelines in the management of liver trauma and appropriate monitoring of NOM patients

Results: In our study, of a total population of 50 patients, 45 were male (90%) and 5 were female (10%) patients. Out of 50 patients in the study, 48 were alive (96%) and 2 patients expired (4%). 37 were due to road traffic accidents, 9 were due to falling from a height, 2 were due to assault, and 2 were due to train traffic accident. 44 were managed conservatively and 6 were operated. 48 patients had abdominal pain, 18 had vomiting, 46 had tenderness and 39 patients had guarding at the time of presentation. 6 patients had hemodynamic instability (hypotension and tachycardia). 22 were grade -1, 12 were grade -2, 10 were grade -3, 5 were grade -4, 1 was grade 5, and no grade 6 injuries were observed (AAST grades). 34 were grade 1, 7 were grade 2, 3 were grade 3 and 6 were grade 4 (WSES grades). Out of 44 patients managed conservatively, all 22 grade 1 were alive, all 12 grade 2 were alive, all 7 grade 3 were alive, 2 grade 4 were alive and 1 grade 4 expired. Grade 5 was not managed conservatively. 22 AAST grade 1 managed conservatively, 12 grade 2 managed conservatively, 7 grade 3 managed conservatively and 3 grade 3 operated, 3 grade 4 managed conservatively and 2 grade 4 operated, and 1 grade 5 operated. hemoglobin and hematocrit values of 50 patients

(mean value of the day charted). Improvement of hemoglobin value in patients who were alive was observed. The decline of liver enzymes from abnormality to normalcy in patients who were alive. The variation of WBC values towards normalcy in patients who were alive.

Conclusion: The management of trauma poses definitive the attention in treatment also the physiology and decision can be more effective when both anatomy of injury and its physiological effects are combined. So WSES classification and recommendations help in choosing optimal management strategy and appropriate protocol for operative and nonoperative management, combining both anatomical and physiological status of the patient when compared to AAST grade which does not incorporate the physiological status of the patient.

Keywords: Liver Trauma, World Society Of Emergency Surgery (WSES) Hemodynamic Instability

Introduction

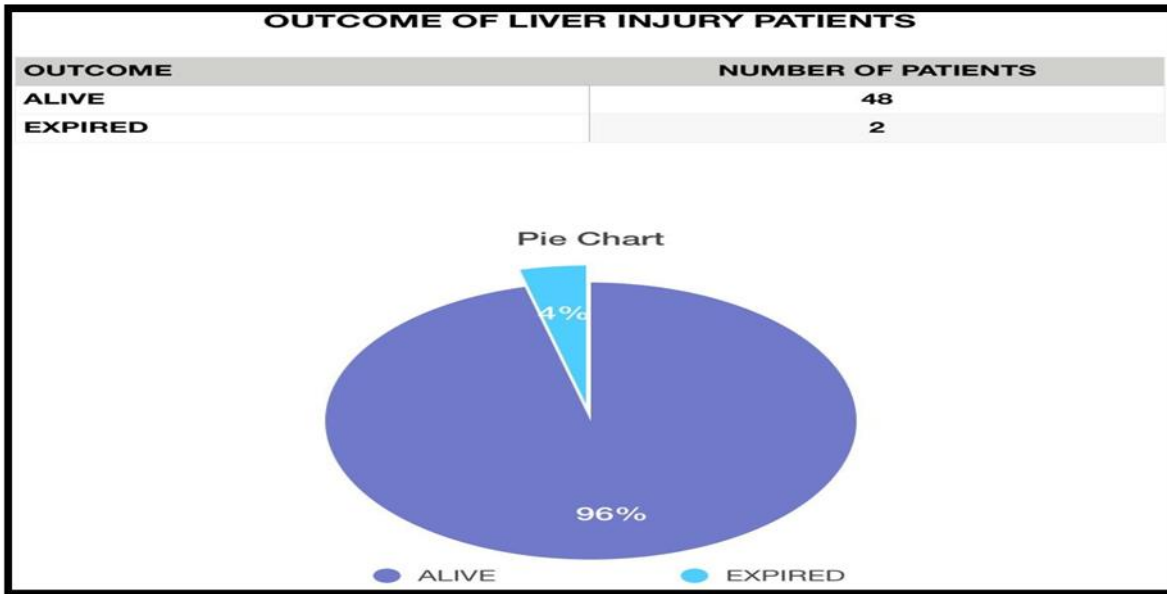
Liver injuries are common in any high-volume trauma center. Our knowledge of its management has improved in the past three decades. Recent advances and minimally invasive techniques play a vital role in the conservative approach. It is very difficult for a trauma surgeon to control massive bleeding occurring in the liver following trauma.[1]The bleeding structure is very tough to find out, and the crucial period to save the trauma victim before the onset of hypothermia, acidosis, and coagulopathy—the markers of an irreversible physiologic insult.[2]Usual techniques of elective hepato-biliary surgery like segmental resection do not apply in a hostile environment where the timing of intervention is a major factor in saving the life of the patient[3]. The management of hepatic trauma has been a formidable challenge to all surgeons. The evolution of the management of hepatic trauma over the recent years is a reflection of the rapid understanding of the key parameters deciding the line of management in hepatic trauma. [4]There were poor outcomes in patients where resection was done but future learning of the injured patient's pathophysiology paved way for the concept of damage control that has been the

key in modern trauma management.[5]Meanwhile better learning of the outcome of various liver injuries in clinically stable patients has increased the conservative line of approach by using the modern imaging and minimally invasive procedures[6]

Materials & Methods

This Observational study (Prospective) was conducted in Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai from February 2018 to September 2019. All trauma victims sustain blunt and penetrating trauma to the liver with or without associated injuries. AAST grading system will be used to assess the anatomy of liver injury. WSES classification will be the standard methodology used to assess the severity of the liver injury. Management of liver injury will be based on WSES guidelines. Patients managed conservatively will be followed up prospectively and till discharge or death. Serial Abdominal examination. Time of reinitiating oral intake. Duration and intensity of restricted activity, Conclusions will be drawn based on the above parameters and all efforts to decide the effectiveness of WSES guidelines in the management of liver trauma and appropriate monitoring of NOM patients.

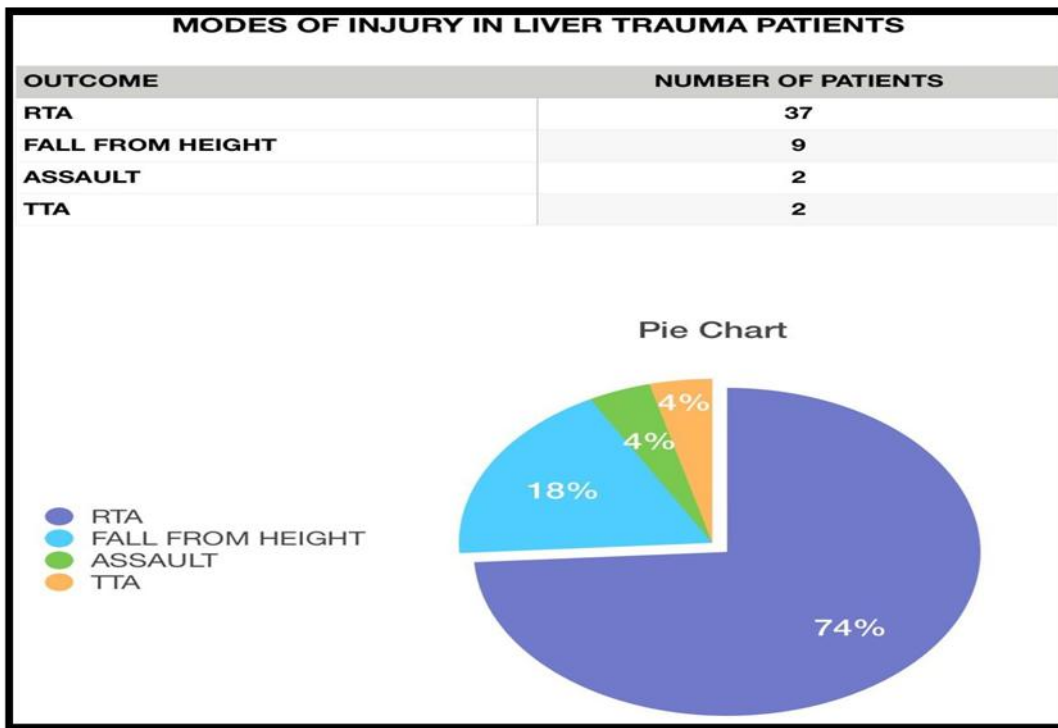
Graph :1 outcome of liver injury patients



Graph :1 In our study, of a total population of 50 patients, 45 were male (90%) and 5 were female (10%) patients.

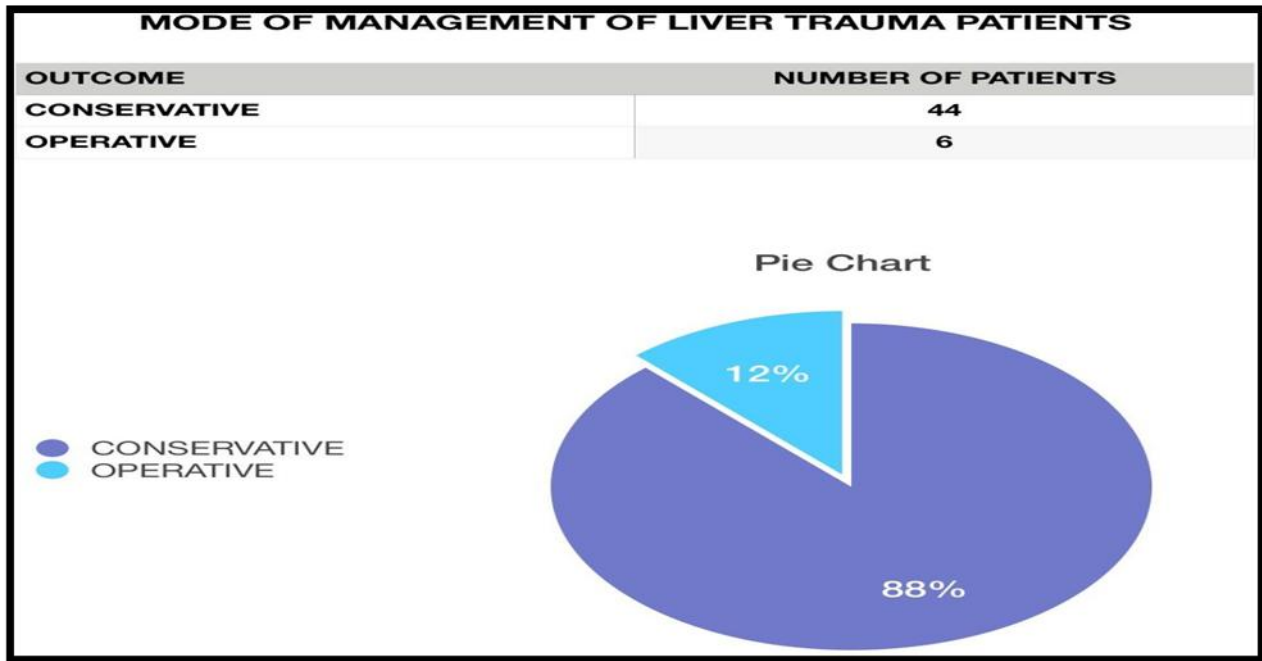
Out of 50 patients in the study, 48 were alive (96%) and 2 patients expired (4%)

Graph:2 Modes Of Injury In Liver Trauma Patients



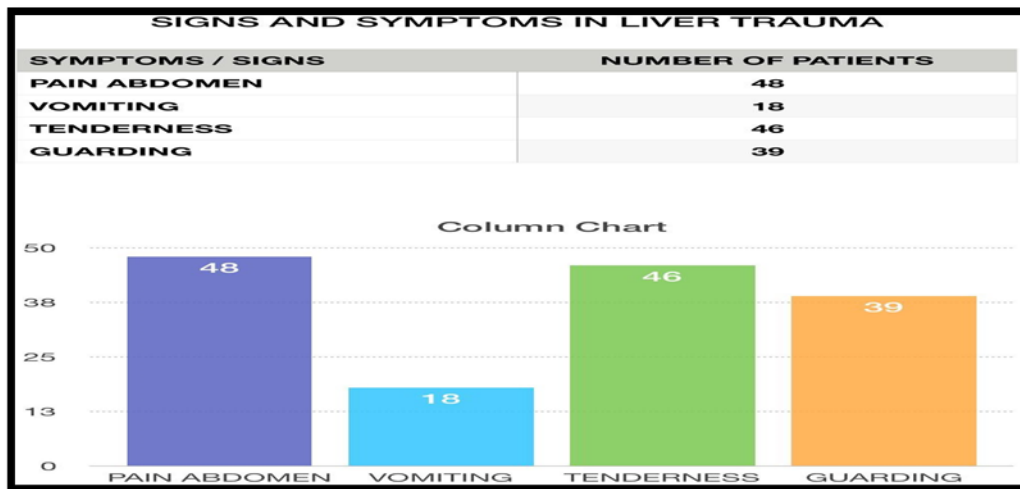
Graph:2 Out of 50 patients in the study, 37 were due to road traffic accidents, 9 were due to falls from height, 2 were due to assault, and 2 were due to train traffic accidents.

Graph :3 Mode Of Management Of Liver Trauma Patients



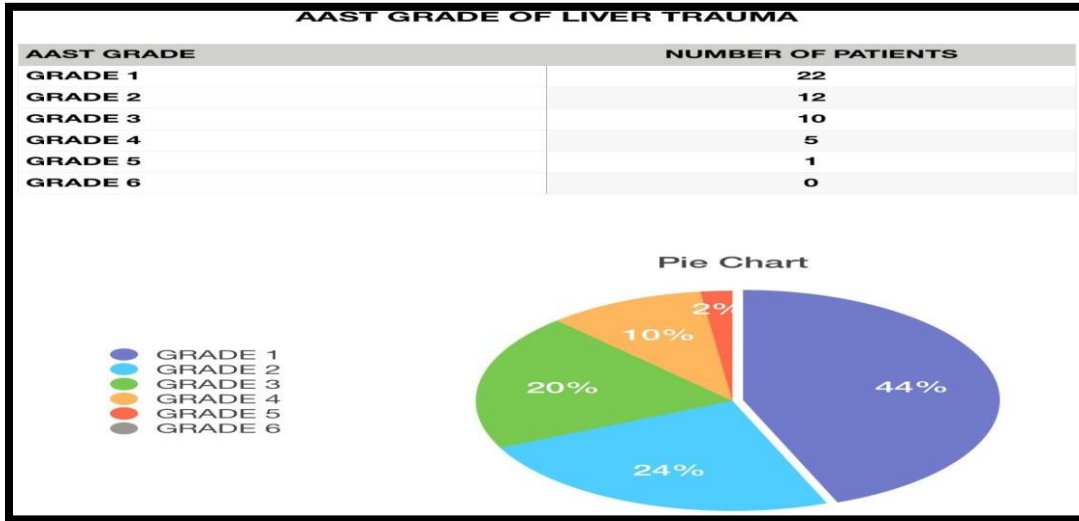
Graph :3 Out of 50 patients in the study, 44 were managed conservatively and 6 were operated on

Graph:4 Signs & Symptoms Of Liver Trauma



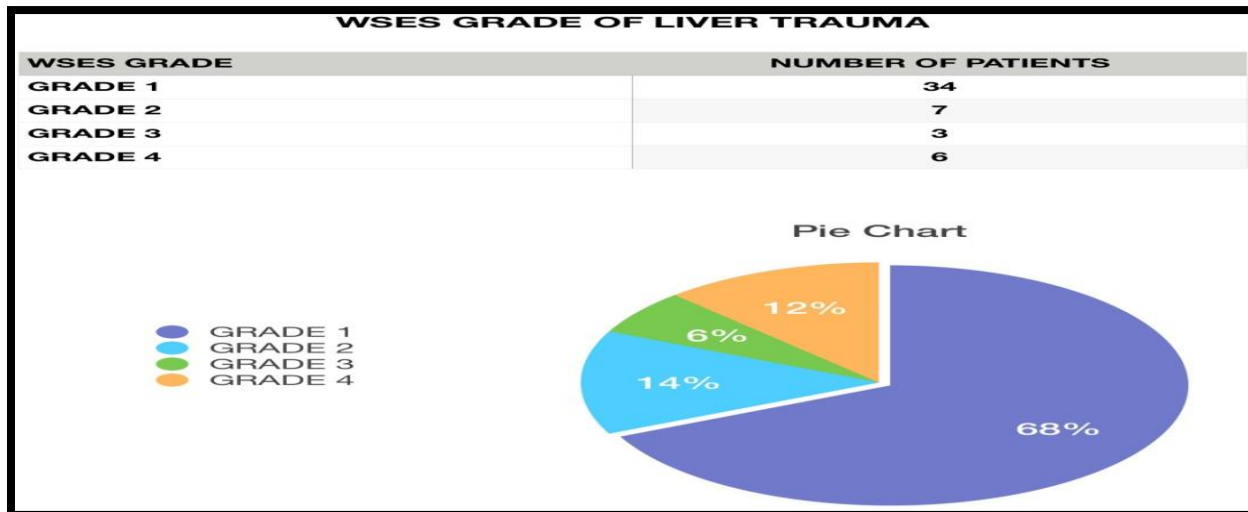
Graph:4 In the study, 48 patients had abdominal pain, 18 had vomiting, 46 had tenderness and 39 patients had guarding at the time of presentation. Out of 50 patients in the study, 6 patients had hemodynamic instability (hypotension and tachycardia).

Graph:5 Aast Grade Of Liver Trauma



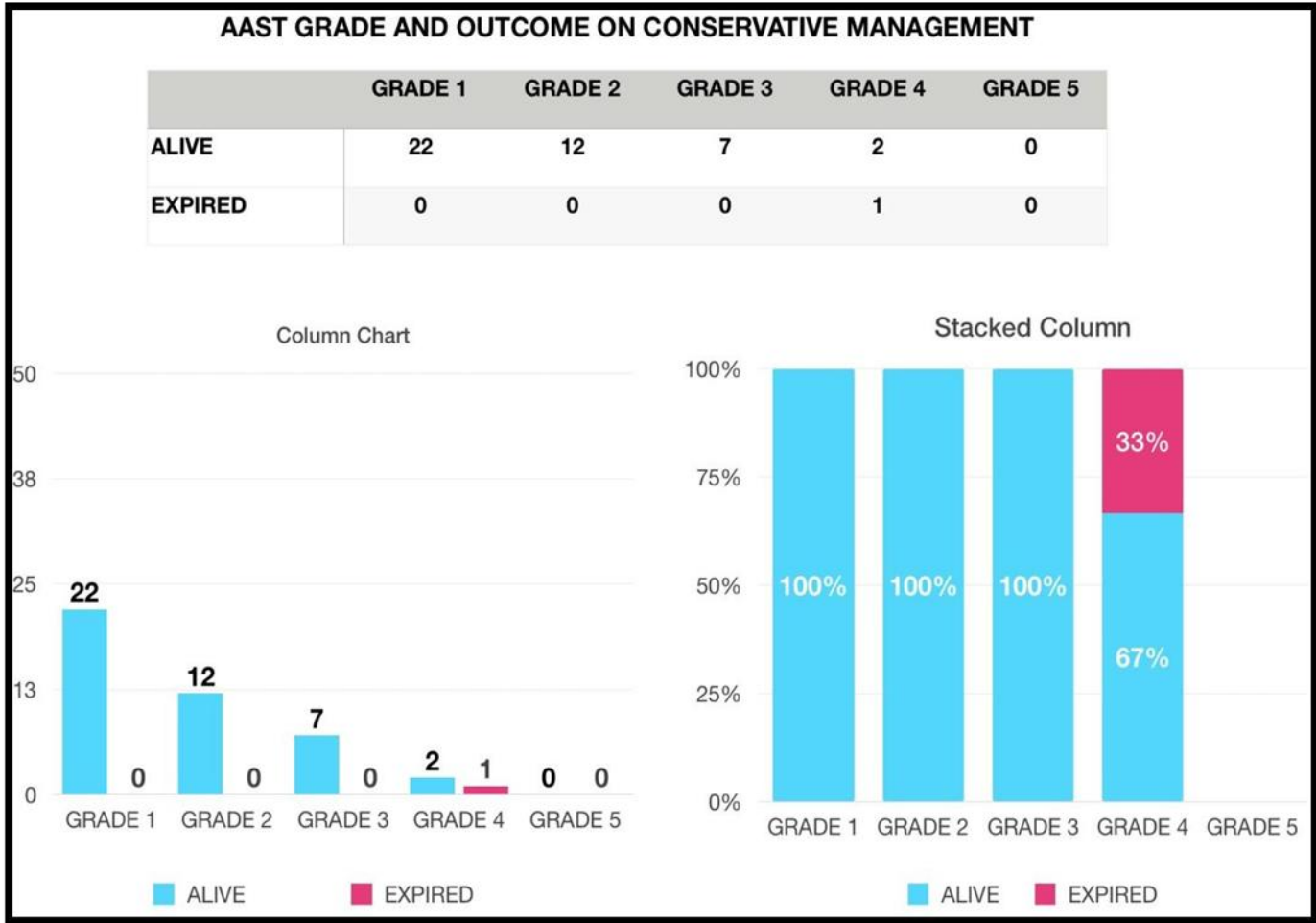
Graph:5 Out of 50 patients in the study, 22 were grade -1, 12 were grade -2, 10 were grade -3, 5 were grade -4, 1 was grade 5, and no grade 6 injuries were observed(AAST grades).

Graph:6 Wses Grade Of Liver Trauma



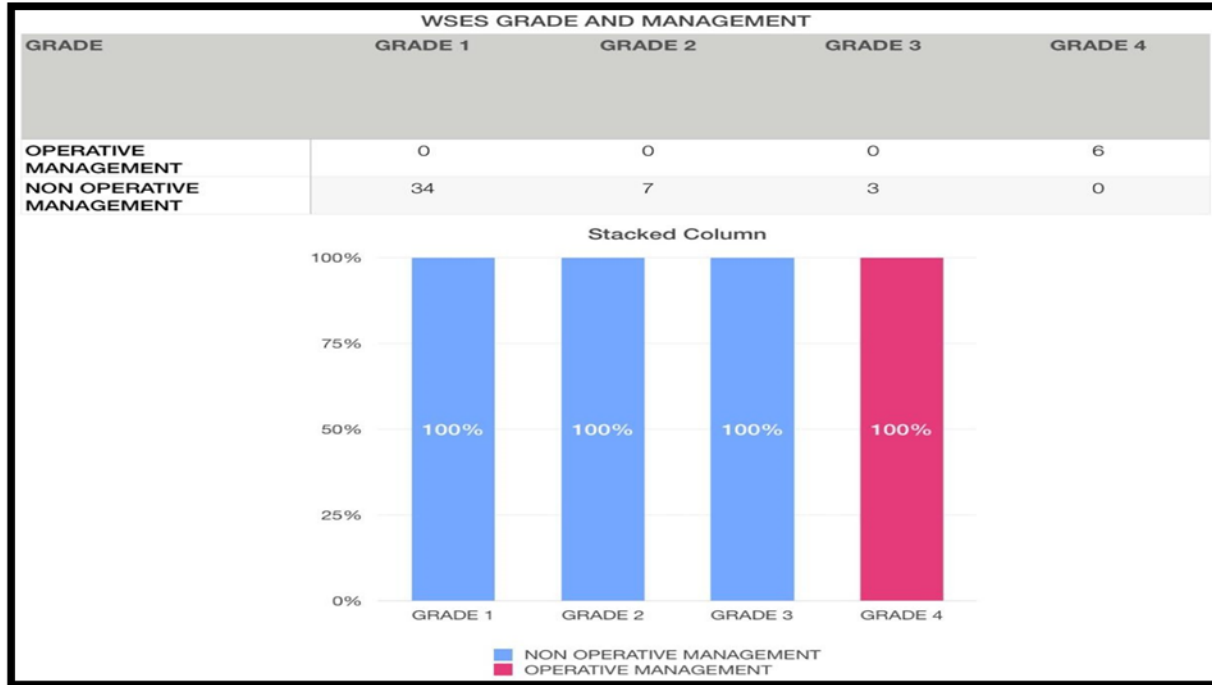
Graph:6 Out of 50 patients in the study, 34 were grade 1, 7 were grade 2, 3 were grade 3 and 6 were grade 4 (WSES grades).

Graph:7 Aast Grade And Outcome On Conservative Management



Graph:7 Out of 44 patients managed conservatively, all 22 grade 1 were alive, all 12 grade 2 were alive, all 7 grade 3 were alive, 2 grade 4 were alive and 1 grade 4 expired. Grade 5 was not managed conservatively.

Graph:8 Wses Grade And Management



Graph:8 out of 50 patients in the study, all 34 WSES grade 1 managed conservatively, all 7 grade 2 managed conservatively, all 3 grade 3 managed conservatively and all WSES grade 4 were operated. Out of 44 managed conservatively, all 34 WSES grade 1 were alive, all 7 grade 2 were alive, 2 grade 3 were alive, and 1 grade 3 expired. WSES grade 4 was not managed conservatively. Out of 50 patients in the study, all 34 WSES grade 1 were alive, all 7 WSES grade 2 were alive, 2 WSES grade 3 were alive and 1 expired, 5 WSES grade 4 were alive and 1 expired.

Discussion

This study involving 50 patients was conducted in RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL CHENNAI over 18 months approximately (February 2018 - to September 2019) recording all the patients admitted to the trauma ward who were fitting the inclusion criteria. Patients admitted with liver injury having hemodynamic instability despite resuscitation, suspected peritonitis, suspected bowel injury, and penetrating injury were taken for laparotomy. 6 patients were operated on. Out of the 6 patients operated on, all were having WSES grade 4. Out of the 6 patients operated on, 3 were having AAST grade 3 liver injury, 2 were having AAST grade 4 injury and 1 patient had AAST grade 5 injury. [7] Only one patient with AAST grade 4 and WSES grade 3 on conservative management had sudden fall in hemoglobin level and developed hemodynamic instability during treatment on day 2 and planned for emergency laparotomy but expired before proceeding to surgery. [8] No patient

in the operative group had lung injury and all patients who underwent the tarsorrhaphy and packing were extubated successfully. Only one patient with AAST grade 5 and WSES grade 4 could not be extubated due to severe hypoxia caused by associated splenic injury. [9] Only one patient who developed hemodynamic instability during conservative management was intubated due to hypoxia caused by a sudden fall in hemoglobin. No other patients required ventilatory care. ICD removal was done in lung injury-associated patients after a serial chest x-ray and lung expansion. No respiratory infection was encountered in the conservative group. The grade of liver injury had no association with respiratory complications. [10] On average the operative group required 5 packed cell transfusions and 8 fresh frozen plasma transfusions per patient. The higher the grade, the higher the requirement for transfusions. This group required on average less than 2 packed red blood cells and less than 4 fresh frozen plasma per patient. The lower grades almost required no transfusions. In the operative group, the perihepatic

group developed more wound site infections requiring secondary suturing.[11]The herniorrhaphy and debridement group fared well compared to the packing group suggesting re laparotomy delays the wound healing and induces higher wound infection.[12]The average duration of hospital stay for the conservative group is 14 days and for the operative group is 24 days. Regardless of the grade of the injury, the length of stay is less in the conservative group adding a logistic advantage over the operative group. One patient in the operative group expired due to associated splenic injury causing severe hypoxia on postoperative day 1. One patient in the conservative group expired despite the best intensive care.[13]The probable cause of death could be an associated injury explaining the shortcoming of a CT scan in a few situations. Hence the conservative approach is justified in all hemodynamically stable patients (WSES grades 1, 2, and 3) irrespective of the AAST grade of the liver injury. Three patients in the operative group developed moderate post-operative intraabdominal collections and the collections were drained under ultrasound guidance.[14]No patients in the conservative group developed complications like biloma, biliary fistula, liver abscess, etc. Follow-up USG/CT abdomen showed early resolution of the lesion in lower grades when compared to higher grades.[15]

Conclusion

The management of trauma poses definitive the attention in treatment also the physiology and decision can be more effective when both anatomy of injury and its physiological effects are combined. So WSES classification and recommendations help in choosing optimal management strategy and appropriate protocol for operative and nonoperative management, combining both anatomical and physiological status of the patient when compared to AAST grade which does not incorporate the physiological status of the patient. NOM is the modality of choice in hemodynamically stable patients irrespective of AAST grade of liver injury. In incorporating NOM, consistent hemodynamic stability is required. If there are findings of sepsis-like biloma, infected necrosis, and liver abscess at any point in time the first option of intervention will be minimally invasive procedures like image-guided drainage. If there are features of peritonitis or

hemodynamic instability during nonoperative management, then laparotomy must be considered without any delay. Operative management is employed for hemodynamically unstable patients. The first step will always be a Pringles maneuver to identify the possible source of bleeding which can be from either the portal vein or hepatic artery and hemostasis can be achieved by topical hemostatic agents like gel foam etc. If the patient's hemodynamic status is in jeopardy then Perihepatic packing serves as the best operative intervention in reversing the patient's hemodynamic status to normalcy.

References

1. Andersson R, Bengmark S. Conservative treatment of liver trauma. *World J Surg.* 1990 Jul-Aug;14(4):483–486.
2. Badger SA, Barclay R, Campbell P, Mole DJ, Diamond T. Management of liver trauma. *World J Surg.* 2009;33:2522–2537.
3. Coccolini F, Coimbra R, Ordonez C, et al. Liver trauma: WSES 2020 guidelines. *World J Emerg Surg.* 2020;15:24.
4. Costa G, Tierno SM, Tomassini F, Venturini L, Frezza B, Cancrini G, Stella F. The epidemiology and clinical evaluation of abdominal trauma. An analysis of a multidisciplinary trauma registry. *Ann Ital Chir.* 2010;81:95–102.
5. Delius RE, Frankel W, Coran AG. A comparison between operative and nonoperative management of blunt injuries to the liver and spleen in adult and pediatric patients. *Surgery.* 1989 Oct;106(4):788–793.
6. Durham RM, Buckley J, Keegan M, Fravell S, Shapiro MJ, Mazuski J. Management of blunt hepatic injuries. *Am J Surg.* 1992 Nov;164(5):477–481?
7. Fabian TC, Croce MA, Stanford GG, Payne LW, Mangiante EC, Voeller GR, Kudsk KA. Factors affecting morbidity following hepatic trauma. A prospective analysis of 482 injuries. *Ann Surg.* 1991 Jun;213(6):540–548.
8. Federico JA, Horner WR, Clark DE, Isler RJ. Blunt hepatic trauma. Nonoperative management in adults. *Arch Surg.* 1990 Jul;125(7):905–909.

9. Ferrah N, Cameron P, Gabbe B, Fitzgerald M, Martin K, Beck B. Trends in the nature and management of serious abdominal trauma. *World J Surg.* 2019;**43**:1216–1225. doi: 10.1007/s00268-018-04899-4.
10. Flint LM, Mays ET, Aaron WS, Fulton RL, Polk HC. Selectivity in the management of hepatic trauma. *Ann Surg.* 1977 Jun;**185** (6):613–618.
11. 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**:272–276.
12. Hiatt JR, Harrier HD, Koenig BV, Ransom KJ. Nonoperative management of major blunt liver injury hemoperitoneum. *Arch Surg.* 1990 Jan;**125**(1):101–103.
13. Hofman K, Primack A, Keusch G, Hrynkow S. Addressing the growing burden of trauma and injury in low- and middle-income countries. *Am J Public Health.* 2005;**95**:13–17. doi: 10.2105/AJPH.2004.039354.
14. Karim T, Topno M, Reza A, Patil K, Gautam R, Talreja M, Tiwari A. Hepatic trauma management and outcome; our experience. *Indian J Surg.* 2010;**72**:189–193.
15. Knudson MM, Lim RC, Jr, Oakes DD, Jeffrey RB., Jr Nonoperative management of blunt liver injuries in adults: the need for continued surveillance. *J Trauma.* 1990 Dec;**30**(12):1494–1500.
16. Lucas CE. Splenic trauma. Choice of management. *Ann Surg.* 1991;**213**:98–112.
17. Malhotra AK, Fabian TC, Croce MA, Gavin TJ, Kudsk KA, Minard G, Pritchard FE. Blunt hepatic injury: a paradigm shift from operative to nonoperative management in the 1990s. *Ann Surg.* 2000;**231**:804–813
18. Meredith JW, Young JS, Bowling J, Roboussin D. Nonoperative management of blunt hepatic trauma: the exception or the rule? *J Trauma.* 1994 Apr;**36**(4):529–535.
19. Moore EE, Shackford SR, Pachter HL, McAninch JW, Browner BD, Champion HR, Flint LM, Gennarelli TA, Malangoni MA, Ramenofsky ML, et al. Organ injury scaling: spleen, liver, and kidney. *J Trauma.* 1989 Dec;**29**(12):1664–1666.
20. Pachter HL, Spencer FC, Hofstetter SR, Liang HG, Coppa GF. Significant trends in the treatment of hepatic trauma. Experience with 411 injuries. *Ann Surg.* 1992 May;**215**(5):492–502.