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LIVER INJURIES IN MOSUL CITY

***Dr. Raad Abdalhadi Ayoob and Dr. Ashraf Khamees Rajab**

[1]M.B.Ch.B-C.A.B.M.S/Al-Salam Teaching Hospital in Mosul City.

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***Corresponding Author: Dr. Raad Abdalhadi Ayoob**

M.B.Ch.B-C.A.B.M.S/Al-Salam Teaching Hospital in Mosul City.

ABSTRACT

Background: The liver is the most commonly injured solid intra-abdominal organ. The primary goal in the treatment of severe abdominal injuries is to preserve life of the patient. **Objectives:** Incidence, treatment modalities and post-operative complications of liver injuries in Mosul shall be studied, documenting the various types of such injuries. **Patients and Methods:** With 44 out of the initial 412 patients displaying blunt or penetrating liver injury in a prospective randomized study, data collection forms for each patient were compiled. The forms amassed information about age, sex, clinical features, type of injury, diagnosis method, grade of injury, postoperative complications, associated intra-abdominal injuries, and mortality. For exploring all patients, an upper midline incision was employed, with the possibility of extension. **Results:** 79.5% of the participants in this research were male, with a total of 35 individuals, while the remaining 9 were females. Incidents of patients were noted at a rate of 20.5%. Of those cases, 34.1% occurred in the age range of 21-30 years old, which was the highest peak age incidence. Bullets and other penetrating mechanisms caused injuries to thirty three patients. Injuries ranged from stabbings and shrapnel wounds to eleven patients being harmed. There were several patients who suffered from blunt abdominal trauma. Grade I injuries were sustained by only a few (6.8%), while the majority (36.4%) experienced grade II liver damage. There were also those who experienced grade III injuries (27.3%), grade IV injuries (20.4%), and grade V injuries (9.1%). The most frequently harmed area in cases of penetrating trauma was found to be the diaphragm. Liver injury often includes an intra-abdominal organ complication, which can happen 15% of the time. Blunt trauma frequently damages the spleen in patients. The most common issue encountered was intra-abdominal abscess, which affected 4 patients and caused trauma. The mortality rate after surgery stands at 11.4%, while a 4% chance of suffering from a frequent post-operative complication exists. For all patients who were examined, a closed drainage method was utilized. **Conclusions:** Injured livers are frequently seen in traumatized individuals. These injuries often come from bullets, stabs, or shrapnel fragments, with men being affected more than women. The largest age group affected were those between 21-30 years old, making up 34.1% of cases. AAST ranks the most common grade of injury as grade II, accounting for 36.4% of cases.

KEYWORDS: Blunt Injury, Liver, Penetrating Injuries.

INTRODUCTION

In patients who have experienced trauma, liver injury can occur frequently. Reported to be between 1%-8%, blunt multiple trauma can impact the liver. Up to a quarter of patients who suffer from blunt trauma may show signs of injury detection.[1] As the starting point, a computed tomography (CT) scan of the entire body is conducted. admitted trauma patients with severe injuries undergo a diagnostic procedure.[2]

Liver trauma, particularly blunt trauma, remains a cause of considerable morbidity. blunt liver injury can be fatal, as reported mortality rates demonstrate. From 1 to 2, the percentage fluctuates between 11.7% and 4.1%. There has been a shift in the way things are done over the past ten years, a paradigm shift of sorts blunt liver trauma can be managed through non-surgical methods.[3] This approach is increasingly popular. with regards to patients who are hemodynamically stable, the most favored plan is to adopt a specific strategy. well-organized trauma centers have recently found that the treatment rate for patients suffering from blunt liver trauma ranges between 71% to 89%.[4]

Despite fluid resuscitation, emergency laparotomy should be performed on patients who are hemodynamically unstable and exhibit peritonitis, an indication of hollow viscus injury. Non-surgical options yielding success rates between 85%-94% are available.[3,4]

Several factors have contributed to the shift away from routine surgical management of blunt liver injuries.[4,5] One major influence has been the widespread use of helical CT in diagnosing and treating this type of trauma. By providing detailed information on pathologic anatomy, injury severity, hemoperitoneum levels, and associated damage to other abdominal organs, retroperitoneal structures, and the gastrointestinal tract, CT has played a significant role in this change.[6,7] Using CT, we can monitor the recovery process of liver injuries and detect any complications that may arise while the Patient undergoes non-surgical treatment. Additionally, Interventional radiologic procedures are frequently utilized to handle blunt liver trauma, with techniques such as angiographic embolization to manage active arterial bleeding and image-guided percutaneous drainage to treat infections or fluid buildup, further supporting non-surgical management.[8,9]

Objectives: To In Mosul, the goal was to investigate the various liver injuries that occurred and to report on the frequency, ways of treatment and complications after surgery.

PATIENTS AND METHODS

Teaching Hospitals in Mosul city had participated in a potential randomized study conducted from October 2010 to. The study took place at both Al Jumhoori and Al-Salam.

In October of 2011, a study was conducted on 412 patients who had experienced abdominal injuries from both blunt and penetrating trauma. Out of the group, only 44 patients were identified as having liver injuries, with 35 being male and 9 being female. The majority of these patients were between the ages of 21-30. Diagnosis of injuries varied among patients, with those who had penetrating injuries diagnosed through exploratory laparotomies from shell fragments and gunshots. Those with blunt trauma and stab injuries were diagnosed through clinical evaluation and local exploration, as well as utilizing available investigations such as peritoneal tap and U/S.

Data collection forma arranged for each patient included: gender, age, type of injury, clinical features, grade of injury, associated intra-abdominal injuries, management, post-operative complications, mortality and the cause of death. All patients who underwent operations were explored through mid-line incision (with extension if needed). Closed tube drainage was used to all. The assessment of the grading of the liver injury preoperatively had been done by clinical evaluation, U/S and some patient need Diagnostic Peritoneal Lavage (blunt trauma). While pre-operatively we depended on measuring of the length and the depth of the wound in addition to the site of the wound in the liver.

RESULTS

Most liver injuries occurred in adults, the peak incidence of age was in those patients between (21-30) years old (34.1%), while the lowest incidence was in elderly patients above 60 years (2.3%) as shown in figure (1).

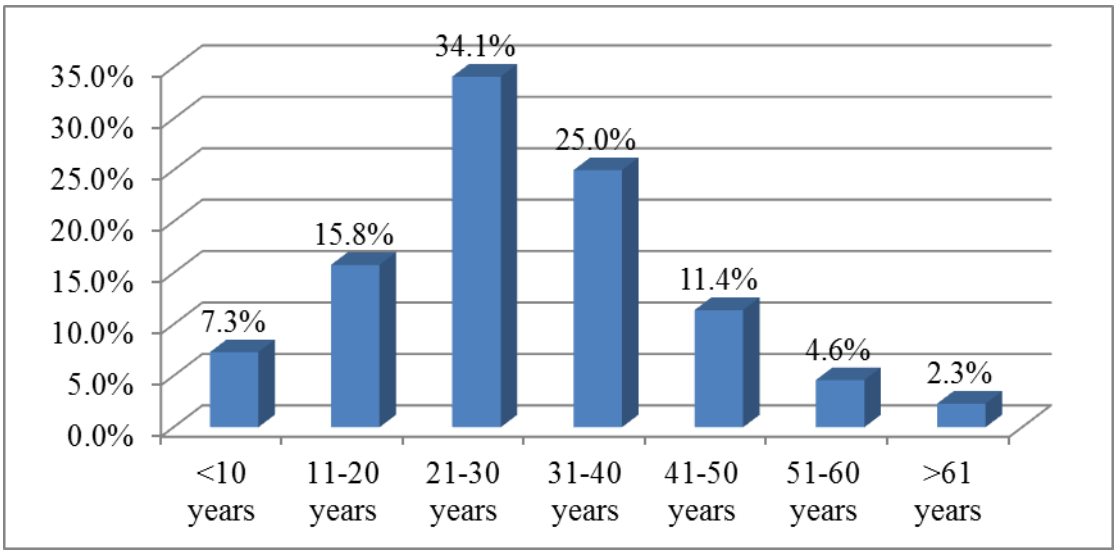

Figure (1): Distribution of study sample according to age groups.

The causes of the liver injuries were demonstrated in table (1) which revealed that 33 patients (75.0%) of all patients in this study were presented with penetrating liver injuries, majority of them 20 patients (45.5%) was due to bullets followed by sharpnels fragmented injuries in 8 patients, and 5 patients were injured by stabs. While

11 patients (25.0%) of all patients were presented with blunt injury, majority of them 9 (20.5%) were due to RTA and only 2 of them (4.5%) were injured by FFH.

Table (1): Causes of liver injuries.

Causes	No. of patients	No. of the liver injury	%
Gunshots	227	20	8.9
Shrapnel injury	47	8	17.0
Stab	54	5	9.3
Total of penetrating injury	328	33	10.1
RTA	53	9	17.0
FFH	31	2	4.5
Total of blunt injury	84	11	13.1
Total	412	44	10.7

Both blunt and penetrating liver injuries were more common in males. There were 35 of injured patients were males (79.5%) while only 9 of injured patients were females (20.5%) as illustrated in figure (2).

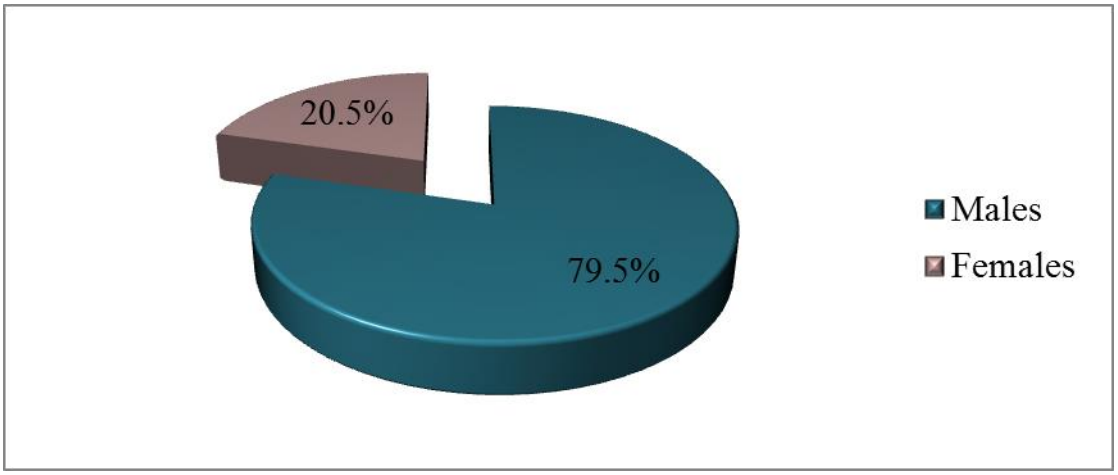

Figure (2): Distribution of patients according to sex.

The diagnosis of liver injuries was demonstrated in table (2) and showed that for the patients presented with penetrating abdominal injuries by gunshots and shrapnel, the diagnosis of liver injury was done by clinical evaluation, US and exploratory laparotomy in addition to three patients with stab injury.

Table (2): Methods of diagnosis.

Methods of diagnosis	No. of patients	%
Exploratory	31	70.4
Peritoneal tap	7	15.9
Ultrasound	5	11.4
CT Scan	1	2.3
Diagnostic laparoscopy	0	0
Total	44	100

In figure (3), the AAST's liver injury grading system displayed six different grades of liver injuries. Out of all the patients, grade II was the most frequent, with 16 recording it (36.4%). There were, however, no patients diagnosed with grade VI.

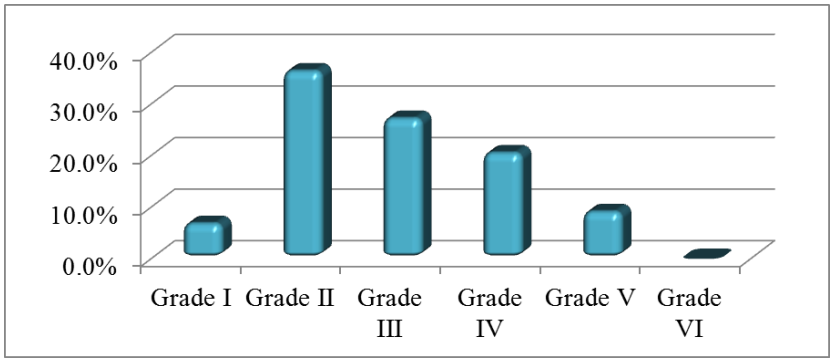

Figure (3): Distribution of the liver injuries according to grades.

Table (3) showcased the varied complications experienced by liver injury patients. The most common complication was found to be intra-abdominal abscess, which occurred primarily after penetrating injuries. Following closely was post-operative bleeding, which was more prevalent among those with blunt injuries.

Table (3): Types of complications in patients with liver injuries.

Type of complication	No. of patients		
	Penetrating injuries	Blunt injury	Total
Intra-abdominal abscess	3	1	4
Post-operative bleeding	1	2	3
Biliary fistula	1	1	2
Hemobilia	0	0	0
Biliary tract structure	0	0	0
Biloma	0	0	0
Vascular complications	0	0	0
Liver failure	0	0	0

DISCUSSION

In this study the total no. of the patients with penetrating abdominal injuries (328 patients) is more than the total no. of the patients with blunt abdominal injuries (84 patients), but the percentage of liver injuries is more common in blunt abdominal trauma (13.7%) than penetrating abdominal trauma (10.1%). The peak age of incidence was between (21-30) years (34.1%), while in other studies [10-12] the usual age of liver trauma is between (20-40) years and mainly due to RTA.

The prevalence of liver injuries was higher among males (79.5%) than females (20.5%), with both penetrating and blunt injuries being equally common. Previous research[10-13] conducted around the globe has echoed these findings, citing the male population as being more susceptible to these injuries due to their higher involvement in RTA. However, the current study specifically attributes the higher incidence of liver injuries among males to the country's grim reality of gunshots and explosive injuries.

The penetrating injuries of the liver by bullets and shrapnel were the most common cause of liver injuries and this was due to the unstable condition of Mosul. In a study done in Germany, the percentage of penetrating liver injuries was 39.7%, while the blunt liver injuries was 60.3%.[12] Another study done in Thailand, 45% of the patients were injured by penetrating mechanism, while the remaining 55% were injured by blunt mechanism, mainly by RTA.[14] Also a study done in India showed that 67% of the patients were injured by blunt mechanism, while 33% were injured by penetrating mechanism.[15] In all those studies, the blunt mechanism was the most common cause of liver injuries and mainly due to RTA.

In this study, most of the patients presented to the emergency department were injured by bullets or shrapnel and the diagnosis was done by clinical evaluation, U/S and exploratory laparotomy. Shortage of the investigatory facilities after 02:00 pm in our hospital had limited the use of investigation for those patients with abdominal blunt trauma. US done for all patients with a blunt abdominal trauma and the diagnosis of intra-abdominal bleeding was proven, and was confirmed after exploratory then the diagnosis of liver injury laparotomy Peritoneal tap was done for some patients with penetrating abdominal trauma without a clear evidence of peritoneal penetration and no U/S available at night. Seven patients (15.9%) were proven to have intra-abdominal bleeding by this technique and the diagnosis of liver injury again was confirmed after exploration. The use of diagnostic U/S to evaluate patients with abdominaltrauma advocated since 1970s. Many years later, the introduction of Focused Assessment Sonography for Trauma has replaced the DPL as rapid, portable, non-invasive and accurate technique that can be performed by emergency physicians and trauma

surgeons to detect hemo-peritoneum. The minimal threshold to detect hemo-peritoneum is unknown exactly. Kawauchi and team made the discovery that U/S had the ability to identify 70 ml of blood,[16] though it's unclear how.

In instances of liver damage, ultrasonography is useful in locating different types of mechanical impairment, including contusions, cholangiomas, and hematomas.[17] An ancient method of curing an acute abdomen, known as peritoneal puncture, was originally postulated in 1906 by Salmon. Positive DPL results for blunt trauma patients were determined when a crude blood aspirate of 10 mL was acquired before flush fluid was infused, and red blood cell count was more than 100,000 (RBC/mL), while white blood cell count exceeded 500 (WBC/mL). Bile, bacteria, fiber, and amylase (if amylase tested positive) also counted towards positive results. Nevertheless, due to the emergence of faster and less invasive techniques, such as in FAST and CT scans, the significance of DPL has diminished.[16] Because most of our patients' injuries were caused by penetrating mechanisms and ultrasonography was available for our traumatized patients, we did not utilize DPL in our current study. The type of treatment required for liver injury can be determined by CT scan results, which serve as the foundation for diagnosis. High-speed spiral CT facilitates the prediction of necessary surgical treatment or angiography prior to the deterioration of a patient's hemodynamic status.[18] Although only one patient underwent CT examination in our study, the benefits of this technology are significant. In the realm of evaluating patients with acute abdominal trauma, McGehee et al. conducted research that pitted MRI against CT scanning. Upon analysis, it was shown that MRI did not offer any significant advantages over CT scanning for abdominal trauma.[19] During the latter half of the 1980s, laparoscopy had caught the attention of many as a means of assessing and addressing both blunt and penetrating trauma. Nevertheless, further investigations brought to light considerable impediments and advised against its employment.[20-22] Notably, in this particular study, there was no employment of laparoscopy in diagnosing liver injury for any patient.

The hospital's inspection facilities stop operating at 2:00 pm, which has forced medical professionals to evaluate liver injuries directly during laparotomies. Out of the cases analyzed in this research, 3 (6.89%) of them were classified as grade I, 16 (36.4%) as grade II, 12 (27.3%) as grade III, 9 (20.4%) as grade IV, and 4 (9.1%) as grade V. Interestingly, none of the cases fell under the grade VI classification. In comparison to a study conducted in Edinburgh, 51 cases were examined.

Over a 10-year period, a study of 73 patients revealed that the majority were categorized as grade I and II, while the remaining 15 patients fell into the grade III and IV classification.[23] Meanwhile, another study conducted in Germany with 178 patients found that out of 110 cases, the majority were classified as grade I or II, whereas 68 cases were deemed severe with liver injury ranging from grades III to V.[24] A separate study in Sweden, conducted by Talving et al. revealed that 27% of cases were categorized as grade III, while only 8% were grade I.[25] Modalities of treatment were based upon the grading for this study. Liver damage was observed in a total of 19 cases, with grades I and II being the most common. Manually control bleeding for a temporary treatment.

In Johannesburg, a study consisting of 304 patients who sustained liver injuries from gunshot wounds was conducted. The medical interventions used to address the injury depended on its severity. For Grade III patients, interrupted horizontal mattresses or selective ligation and/or the application of topical hemostatic agents (gel foam) were utilized. Grade IV patients, numbering nine cases, underwent selective ligation and excisional debridement in conjunction with local hemostatic agents. Three out of the four Grade V cases succumbed during surgery, while the remaining patient received perihepatic packing and passed away on the following day post-operation. The interventions used may have included compression, perihepatic packing, simple suturing, or local hemostatic solutions like electrocautery. Simple surgical measures were used for patients with grade I and II injuries while more extensive procedures like resection, debridement, and perihepatic tamponade were necessary for grade III (8.5%), grade IV (52%), and grade V (16%) injuries, as per a study that investigated the treatments used in cases of liver injury.[26]

Velmahos, Tautouzas et al., on the other hand, conducted a study that examined the non-surgical treatment of 55 patients with blunt liver injury. Of these, eight failed for reasons not related to liver injury, three underwent nontherapeutic laparotomy, two underwent splenectomy, and one underwent abdominal decompression due to abdominal compartment syndrome. The rate of success for non-surgical treatment was 85%.[27]

Among the patients who participated in this investigation, those who utilized a closed drainage system were subject to postoperative drainage. Numerous studies, both forward-looking and retrospective, have definitively displayed that the deployment of needle or swamp drains heightens the likelihood of intra-abdominal abscess in contrast to those patients undergoing closed or no drainage. That said, in instances where bile is seeping from the liver or in cases of significant central damage, such drains are of use. It is recommended that drainage be implemented in the aftermath of a hepatectomy to detect and address instances of bile leakage at the earliest possible stage. Tissue damage could result if the drainage remains for longer than 72 hours, therefore removal is necessary. Later bile leakage can arise due to separation of tissue, typically happening between 10 to 14 days after the drain has been removed. Should there be excessive bleeding

right after operation, drainage can uncover it sooner.[28,29] Complications in four patients were most frequently cited.

Severe penetrating injuries are primarily observed in patients, particularly those who have already been seen. In rare cases, nonoperative treatment of blunt liver injury can lead to damage in other organs, as well as the complication of abscess. This occurrence is typically found in patients with severe injury grades of IV or above. According to various reports.[30-32] abscess during nonoperative management of blunt liver injury can happen with an incidence rate of 0.6% to 4%. In India, a study revealed a common incidence of intra-abdominal foreign object presence. In comparison to a German study,[33] the occurrence of abscesses was significantly higher (6%) with a difference of[28] Three patients (6.8%) in this study experienced postoperative bleeding, primarily among those with severe blunt trauma. Of those who received nonoperative treatment for blunt liver injury, the most common complication was delayed bleeding, which was found in 1.7% to 5.9% of cases according to previous reports,[34,35] Fisher and Moulton discovered that 1.7% of children with blunt liver injury who were treated nonoperatively suffered from delayed bleeding in a review of 13 major studies.[36] In this study, two patients (4.5%) had delayed bleeding and it resolved spontaneously without any specific intervention. Reports reveal that about 2.8-7.4% of patients with blunt liver injuries tend to face certain complications, especially those with a severe liver injury of grade III or higher.[6,31,37]

There were no accounts of biliary hemorrhage, liver failure, vascular complications, brain tumors, or biliary strictures in our study. As per other instances, hepatic artery pseudoaneurysm is a rare complication having a prevalence of almost 1%.[38] Complications developed due to bile leakage from damages in the biliary system include biliary fistulas, biliary peritonitis, biliary tumors, and cholemia. In blunt liver injury patients, there is a chance of experiencing complications, which occurs anywhere from 2.8% to 7.4%, as reported in studies.[6,31] One study showed the mortality rate to be 1.49% overall. However, in the US, death rates are estimated to be about 10% in various surveys.[18,28,39] A German study reported mortality to be as high as 15.7%.[12] while a Thai study found mortality to be around 14%.[14]

CONCLUSIONS

Injured livers are a frequent issue for traumatized individuals, with penetrating wounds via bullets, shrapnel fragments, and stabs being the primary cause. Males tended to experience these injuries more often than females, and the age group with the highest rate of incidence was people aged 21-30 years old, who accounted for 34.1% of cases. The AAST determined that the most prevalent grade of liver injury was grade II, representing 36.4% of all injuries.

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