

# MORBIMORTALITY IN PATIENTS WITH HEPATIC TRAUMA

## *Estudo da morbimortalidade em pacientes com trauma hepático*

Olival Cirilo Lucena da **FONSECA-NETO**, Rogério **EHRHARDT**, Antonio Lopes de **MIRANDA**

Study conducted by the General Surgery and Trauma Service of the Hospital da Restauração – SUS, Recife, PE, Brazil

**ABSTRACT – Background** - The liver is the intra-abdominal organ more injured in patient victims of trauma. The injury occurs more frequently in the penetrating trauma. The incidence of mortality for injuries of the liver is 10%. **Aim** - To evaluate the mortality of the patients with hepatic trauma, the treatment applied and its evolution. **Methods** - Were analyzed, retrospectively, the charts of all patients with hepatic trauma and surgical indication. Were analyzed: gender, age, ISS (injury severity score), classification of the abdominal trauma type (open or closed), causing instrument of the open traumas, degree of the injury, hepatic segments involved, presence of associated injuries, type of surgical treatment: not-therapeutic laparotomy and therapeutic laparotomy, reoperations, complications, time of hospitalization in days and mortality. **Results** - One hundred and thirty-seven patients participated. Of these, 124 were men (90.5%). The majority (56.2%) had 20-29 years old. Closed abdominal trauma was most prevalent (67.9%). Of the penetrating traumas, the originated with firearms were in 24.8%. One hundred and three patients had only one injured hepatic segment (75.2%) and 34 (24.8%) two. Grade II injuries were in 66.4%. Of the 137 patients with laparotomy, 89 had been not-therapeutic, while in 48 it was necessary to repair associated injuries. Spleen and diaphragm had been the more frequently injured structures, 30% and 26%, respectively. The ISS varied of eight to 72, being the ISS > 50 (eight patients) associate with fatal evolution (five patients). Biliary fistula and hepatic abscess had been the main complications. Seven deaths had occurred. **Conclusions** - Concomitant injuries, hepatic and other organs, associated with ISS > 50 presented higher possibility of complications and death.

**HEADINGS** - Liver. Wounds and injuries.

### Correspondence:

Olival Cirilo Lucena Fonseca Neto  
E-mail: olivalneto@globo.com

Financial source: none  
Conflicts of interest: none

Received for publication: 21/08/2012  
Accepted for publication: 29/11/2012

**RESUMO – Racional** – O fígado é o órgão intra-abdominal mais comumente lesado em pacientes vítimas de trauma. A lesão ocorre mais frequentemente no trauma penetrante do que no contuso. A mortalidade é de 10%. **Objetivo** – Avaliar a morbimortalidade dos pacientes com trauma hepático, o manuseio aplicado a esses pacientes e sua evolução. **Método** – Foram analisados, retrospectivamente, os prontuários de todos os pacientes com trauma hepático e indicação cirúrgica, admitidos na emergência. Consideraram-se: sexo, faixa etária, ISS (injury severity score), classificação do tipo de trauma abdominal (aberto ou fechado), instrumento causador dos traumas abertos, grau da lesão, segmentos hepáticos envolvidos, presença de lesões associadas, tipo de tratamento cirúrgico realizado: laparotomia não-terapêutica e laparotomia terapêutica, reoperações, complicações, tempo de internamento em dias e mortalidade. **Resultados** – Cento e trinta e sete pacientes participaram do estudo. Destes, 124 eram do sexo masculino (90,5%). Quanto à faixa etária, a maioria (56,2%) encontrava-se entre 20-29 anos. O trauma abdominal fechado foi o mais comum (67,9%). Dos penetrantes, os originados por arma de fogo foram em maior número (24,8%). Cento e três pacientes apresentaram apenas um segmento lesado (75,2%) e 34 (24,8%) dois. As lesões de grau II foram as mais comuns (66,4%). Dos 137 pacientes submetidos à laparotomia, 89 foram não-terapêutica, enquanto que em 48 foi necessário reparos das lesões associadas. O baço e o diafragma foram as estruturas lesadas com maior frequência, 30% e 26%, respectivamente. O ISS variou de oito a 72, sendo o ISS > 50 (oito pacientes) associado com evolução fatal (cinco pacientes). Fístula biliar e abscesso hepático foram as principais complicações. Ocorreram sete óbitos no estudo. **Conclusão** – Os pacientes com trauma hepático e lesões orgânicas concomitantes e naqueles com ISS > 50 observou-se maior chance de complicações e óbito.

**DESCRITORES** - Fígado. Ferimentos e lesões.

## INTRODUCTION

Owing to its size and location, the liver is one of the intra-abdominal organs most commonly affected by injuries. Liver damage occurs in 20% of blunt trauma patients<sup>5,10,28</sup>. In such cases the damage may be caused by direct impact; compression between the right costal margin and the spine, and deceleration forces. Damage to the liver alone occurs in only 10% of patients, with most having other damaged organs<sup>29,7,23</sup>.

In recent decades, there has been a dramatic change in the treatment of liver trauma, especially in cases of blunt trauma<sup>22</sup>. This is because of the assistance provided by imaging technology and the emergence of non-surgical treatments<sup>4</sup>. At present, conservative treatment is carried out in 80% of blunt liver traumas, as it is considered the safest and most effective method<sup>15</sup>. The failure of this type of treatment tends to occur as a result of associated abdominal injuries<sup>26</sup>. Conservative treatment of closed liver trauma has a number of advantages in relation to surgery, such as reduced need for blood transfusion, lower occurrence of intra-abdominal sepsis, less need for intensive care and a lower mortality rate<sup>27,11</sup>. A tendency has also been observed to use more conservative techniques for penetrating injuries, especially in the past 30 years<sup>18,13,17</sup>.

Despite the advances made, a complex injury associated with damage to the supra- or retro-hepatic vessels continues to be a treatment challenge in terms of morbidity and mortality<sup>3,1</sup>. At present, the options for dealing with such injuries include: 1) Pringle's maneuver, hepatectomy and direct suture; 2) segmentectomy or hepatectomy; 3) the installation of atriocaval or axillary-femoral shunts; 4) vascular exclusion of the liver; or 5) liver transplant. All these treatments are associated with a mortality of over 90%<sup>16,14,8</sup>.

Liver damage can be classified according to its severity into two groups: pre-surgically by imaging (CT scan), or during surgery by anatomopathological evaluation (American Association for the Surgery of Trauma – AAST, Figure 1)<sup>9,24</sup>.

In view of increasing changes in the management of liver trauma, the aim of the present study was to show how liver trauma and its associated complications are treated at a public hospital in the Northeast region of Brazil.

## METHODS

A retrospective study was carried out of the medical records of all patients with liver trauma recommended for surgery and admitted to the A&E of the Hospital da Restauração, Recife, PE, Brazil, between January 2003 and December 2007.

	Extent of damage	Description
I	Hematoma	Subcapsular, non-expansive, < 10% of surface
	Laceration	Non-bleeding, < 1 cm deep
II	Hematoma	Subcapsular, non-expansive, 10 - 50% of surface
	Laceration	1 - 3 cm deep, < 10 cm in size
III	Hematoma	Subcapsular, expansive, > 50% of surface or intraparenchymal > 2 cm
	Laceration	> 3 cm deep
IV	Hematoma	Bleeding intraparenchymal rupture
	Laceration	Involving 25 - 50% of lobe
V	Laceration	Parenchymal, involving more than 50% of lobe
	Vascular	Juxtahepatic veins, main hepatic veins or retrohepatic cava
VI	Vascular	Hepatic avulsion

FIGURE 1 – Surgical and anatomopathological classification of liver damage (AAST)

The data analyzed were: gender, age, ISS (injury severity score), classification of type of abdominal trauma (open or closed), the instrument responsible for open traumas (e.g. firearm or non-firearm weapon), extent of injury, liver segments involved, presence of associated injuries, type of surgery carried out: non-therapeutic laparotomy (NTL) or therapeutic laparotomy (TL), repeated surgery, complications, duration of hospital stay in days and mortality.

The data were analyzed statistically by calculating arithmetic means and standard deviations and the result presented in absolute terms and as a percentage. Analysis was carried out using SPSS® and Microsoft Office Excel®.

## RESULTS

During the study period 3,476 patients were hospitalized. Of these, 137 had suffered liver trauma and been referred for an exploratory laparotomy.

Age varied from 15 to 55 years. Seventeen were aged under 20 years (12.4%), 77 between 20 and 29 (56.2%), 33 between 30 and 39 (24.1%), seven between 40 and 49 (5.1%) and three over 50 years (2.2%). The ISS of the patients varied from 8 to 72 (Figure 2).

As for the type of abdominal trauma, 93 had suffered a closed trauma (67.9%) and 44 open trauma (32.1%). Ten of the latter had been wounded by a non-firearm weapon (7.3%) and 34 by a firearm (24.8%). (Figure 3).

One hundred and three patients had damage to only one liver segment (75.2%), while 34 had two damaged segments (24.8%). There were no cases of

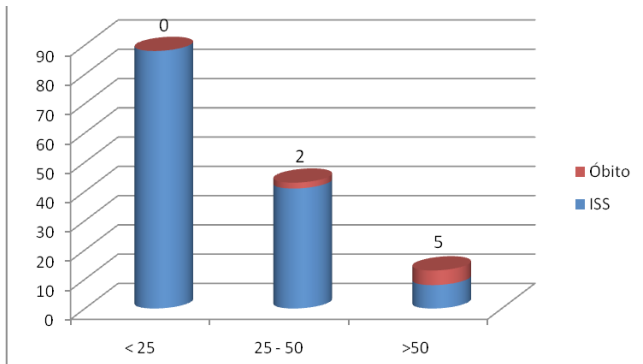
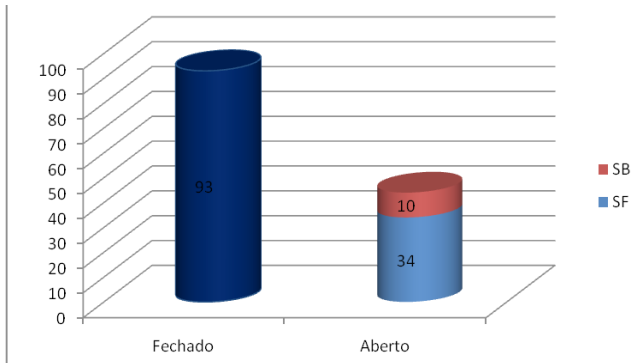


FIGURE 2 – Distribution of patients by score and mortality



NF= non-firearm weapon; F=firearm

FIGURE 3 – Distribution of patients by type of abdominal trauma

more than two segments being damaged. One patient had damage to liver segment I (0.7%); 15 damage to segment II (10.9%); 20 damage to segment III (14.6%); 57 segment IV (41.6%); 35 segment V (25.5%); 17segment VI (12.4%); 15 segment VII (10.9%) and 11 segment VIII (8%).

In terms of the extent of liver damage, in 91 patients, it was second degree (66.4%); in 38, third degree (27.7%); in seven, fourth degree (5.1%), and, in two, fifth degree (1.5%). (Figure 4).

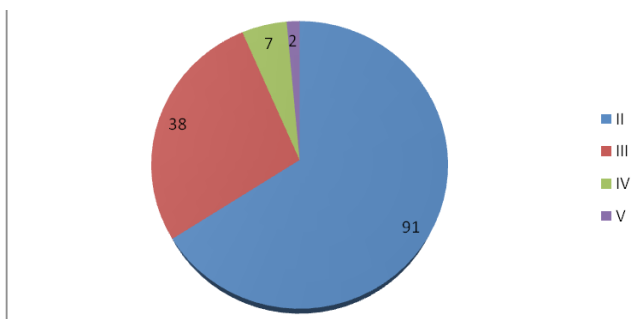


FIGURE 4 – Distribution of patients according to severity of liver damage

In terms of treatment, 89 patients underwent NTL (65%) and 42 TL (35%). Of the cases undergoing surgery, 22 underwent a hepatic tamponade (45.8%);

23 hepatorrhaphy (47.9%); two hepatorrhaphy in combination with tamponade (4.2%) and one a left-side hepatectomy (Table 1).

TABLE 1 – Distribution of patients according to surgery and complications

	n	%
LNT	89	65%
LT	48	35%
Hepatic tamponade	22	45,8% (*)
Hepatorrhaphy	23	47,9% (*)
Hepatorrhaphy and hepatic tamponade	2	4,2% (*)
Left-side hepatectomy	1	2,1% (*)

NTL=non-therapeutic laparotomy; TL=therapeutic laparotomy; (\*) – percentage of total number of patients undergoing TL

In terms of treatment, 29 patients required surgical treatment, in two cases to complement failure of NTL (2.2%); all those who were treated by hepatic tamponade with compression underwent subsequent surgical removal (22 cases); one underwent further surgery to remove the compress after treatment using hepatorrhaphy in combination with a tamponade and four required a second operation after initial treatment using hepatorrhaphy (14.8% of patients).

There were 53 patients with associated injuries (38.7%), 35 of whom had only one (25.5%) and 18 two (13.1%).

Observation of the group of patients with one associated injury revealed injuries occurring in the following organs: diaphragm (seven cases); small intestine (six cases); colon (five cases); spleen and right kidney (four cases each); duodenum, mesentery and pancreas (two cases each) and, in only one patient each, the stomach and the encephalon.

Analysis of those with associated injuries in more than two organs revealed the following locations: spleen (six cases); mesentery (four cases); pancreas (four cases); colon, small intestine and right kidney (three cases each); aorta, bladder, inferior vena cava and costal arches, in only one patient each.

Of the patients with complications, five had undergone NTL (5.6% of the NTL group). Of these, three went on to develop a liver abscess or a biliary fistula and one developed pancreatitis. Post-operative complications occurred in 12 patients (25% of those undergoing TL).

The complications were: biliary fistula (three cases); pancreatitis (two cases); liver abscess (two cases), cavitory abscess (two cases); incarcerated lung, coagulation disorder and sepsis (one case each).

The period of hospitalization varied from two to 38 days, with a mean of 6.8 days (standard deviation = 5.5).

In total, seven patients died, all of them those who had undergone TL, representing 5.1% of the total number of liver trauma patients and 14.6% of the TL group. A very high ISS was associated with death.

## DISCUSSION

As the liver is the largest parenchymal organ in the abdomen and is protected only by the right-hand rib grill, it is prone to blunt and penetrating trauma of the peritoneal cavity. With the development of enhanced imaging techniques it is now possible to identify minor injuries that would have gone unnoticed in the past.

It was noted that the vast majority of patients were men, in a ratio of around ten to one. They were mostly young adult economically productive males aged between 20 and 49 years (a mean age of 27.3 years). Although this figure has been given in the literature for large-scale series, it was more clearly apparent in the present study.

Most of the patients had blunt liver trauma, in a ratio of around 3:1, compared to open abdominal trauma, caused by firearms (24.8%), or non-firearm weapons (7.3%).

The trauma index used for patient triage, the ISS (Injury Severity Score), showed a high capacity to produce an effective prognosis (of survival or death)<sup>21</sup>. Five of the eight patients with ISS > 50 died. Although the injury severity score (ISS) correlates well with mortality, it has a number of restrictions, such as not taking into consideration, age, instrument causing injury, multiple local injuries and the importance of the region of the body affected by the injury<sup>6</sup>.

In terms of the severity of injuries, it was observed that, in 75.2% of cases, only one liver segment was involved, with segments IV and V being the most commonly affected. This was already to be expected, in view of the size and more exposed location of these segments, that have also been reported as being those most affected in other studies of the subject<sup>20,9</sup>.

A considerable portion of patients had injuries associated with other organs (38.7%), only one in 25.5% of cases, and two in 13.1%.

Different from the current literature, the authors showed a higher rate of recommendation for laparotomy<sup>25</sup>. This is due to the lack of immediate ready-made complementary imaging (ultrasound and CT of abdomen) which would have helped physicians to opt for conservative (non-surgical) treatment in many patients. However, no evidence was found that undergoing NTL had an impact on the likelihood of mortality.

The most common complications occurring were: liver abscess, biliary fistula, cavitory abscess and

pancreatitis, most commonly in those with abdominal trauma who underwent TL (25%) compared with those undergoing NTL (5.6%). Even so, the overall incidence of complications was acceptable (12.4%), approximately the same as the results obtained for large-scale series<sup>12,2</sup>.

The overall mortality rate was 5.1% and all of these had undergone surgical treatment (14.6%).

## CONCLUSION

In liver trauma patients recommended for surgery morbimortality was higher when reparative interventions had been carried out, in organs with associated injuries and in patients with an ISS of over 50.

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