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RESEARCH ARTICLE

PATTERN OF TRAUMATIC LIVER INJURIES IN DIFFERENT TYPES OF MEDICOLEGAL OCCURRENCE – AN AUTOPSY BASED STUDY.

Dr. C. S Sreedevi and Dr. Sreelekshmi J.

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Abstract

Background:-Trauma has become an usual accompaniment of modern living. A detailed study of the pattern of injuries sustained may help to reconstruct the whole incident in many cases. In overall visceral susceptibility ,liver is the most frequently damaged abdominal organ.Clinical management of liver injuries depends upon the nature, pattern and severity of injury sustained to that organ. Severe injury to liver alone is sufficient to cause death even in the absence of other vital organ injuries. This study aims at aiding the surgeon to foresee the nature, pattern of injuries that can be sustained to liver in different types of impacts and plan the treatment modalities accordingly.

Materials and methods:-A cross sectional study was conducted at government medical college, Trivandrum based on the medicolegal autopsies done for a period of one year. Death following alleged cases of trauma were closely observed. In those cases were liver injury was found were selected for this study. Eighty eight cases of liver trauma were studied. Liver was examined insitu and detailed examination was done after evisceration.

Results:-Liver injury was common in occupants of road traffic accidents, as observed in 43 cases(48.86%). Right lobe of liver was more vulnerable and was mainly involved in road traffic accidents. Of the 73 cases (83%)of lacerations, 36cases were found in road traffic occurrence (occupants) , followed by pedestrians (12cases). Contusions and incised wounds were seen in 16 cases (18.8%) and 2cases (2.3%) respectively. Transcapsular lacerations were found to be the commonest 59 cases (80.82%) followed by subcapsular, 11 cases (15%).While considering the disposition the most common nature was oblique found in 34 cases(46.6%) followed by sagittal ,found in 27 cases(37%). Seventy sevencases (87.5%), were due to direct force, followed by transmitted force 10cases, (11.36%). Indirect force was observed in one case (1.14%).

Conclusion:-The right lobe of the liver was seen frequently involved both in penetrating and non penetrating trauma .Accidents dominated suicides with respect to liver injuries. Period of survival was inversely proportional to gravity of injury. The amount of blood in the peritoneal cavity depended upon the depth of liver laceration and period of survival. The most common pattern of injury was laceration

Corresponding Author:-.Dr Sreelekshmi j
Address:-.junior resident medical officer, Department of forensic ,medicine and toxicology, Government T.D Medical College, Alappey

followed by contusions. Direct violence was the commonest mechanism of liver injury.

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Introduction:-

Liver isfirm ,pliant to touch, friable and easily lacerated. It is the most frequently injured solid organ in patients suffering from abdominal trauma. The right lobe is injured five times as frequently as the left and the lesions occur on the convex surface twice as frequently as on the concave surface[1].Liver injuries are broadly classified into penetrating and non-penetrating injuries. Haemorrhage, shock and peritonitis are the important complications of penetrating wounds of liver. Other complications include renal failure, biliary fistulas, empyema, sub diaphragmatic abscess and pulmonary embolism. The most common cause of non-penetrating injury of liver is automobile accidents followed by kicks, blows or falling; mostly by forces of compression causing contusions or lacerations[2]. The deceleration that occurs in road traffic accidents may tear the liver from its attachment including the hepatic veins and the structures in portahepatis.Subcapsular and transcapsular lacerations of liver are sometimes responsible for the death of newly born infants during labor with prematurity contributing to it. Liver is frequently injured in child abuse[3].An attempt is therefore made to go slightly deep into the liver trauma cases to find out whether a definite opinion about occurence could be drawn from the pattern of liver injuries sustained and the period of survival of patient depending on the gravity of injury so that it can aid the surgeon in treatment planning.

Aims & objectives:-

1. To findout the type and pattern of injuries to liver consequent to different types of trauma and its manner of causation
2. To findout the period of survival with respect to the depth of liver injury and intraperitonealhaemorrhage

Materials & methods:-

A total of 88 cases of liver injuries were studied in detail, out of the bodies brought for medicolegal autopsy at Government medical college Trivandrum over a period of one year. All autopsies in which the alleged cause of death was trauma were closely observed and those cases where liver injury were found either in isolation or in combination with other visceral injury were selected for the study . Information regarding the cause of trauma and the period of survival were obtained from the requisition for postmortem examination (KPF102). Clinical details were gathered from relevant clinical case records of Government medical college hospitaland Sri.Avittom Thirunnal Hospital,Thiruvananthapuram. Close relatives and friends having first-hand information were interviewed to collect details.Postmortem examination was done and liver was examined in situ to avoid artifacts and detailed examination was done after evisceration.Blood if any was present in the peritoneal cavity,was measured with measuring jar.The data was collected using a semi-structured proforma. Photographs were taken in sample cases. The confidentiality of the data was maintained throughout the study. The data collected was entered in MS excel and results are summarized as frequency and proportions and statistical analysis was done .

Results:-

A total of 88 cases were studied, 77 (87.5%) were males and 11 (12.5%) were females.Suicides were observed in 5(5.7%)cases, and homicides were observed in 3(3.4%) casesand manner of causation of injury was uncertain in two (2.3%)cases. Rest of the cases 78(88.6%)were accidents cases. The majority of accidents were road traffic occurrence ,59 cases and in case of suicides majority of cases were railway occurrence ,4 cases. The uncertain manner was observed in road traffic occurrence and railway occurrence ,1case each.In the present study occupants of road traffic accidents were commonly affected, as observed in 43 cases(48.8%) followed by pedestrians which constituted 16 cases(18.2%).Least common cause was injury by animals, as found in one case (4.6%).Out of 88cases, 59 cases were involved in vehicular accident. It was found that two wheeler riders were commonly affected,18 cases(30.5%), followed by four wheelers, light and heavy vehicles which constituted 15 cases(25.4%) each.It was observed that right lobe of liver was found to be more vulnerable for injury. In 78(88.6%) cases, right lobe was affected and in 18(20.5%) cases left lobe was affected. Quadrate lobe was injured in one case(1.1%) and caudate lobe in 2 (2.3%) cases. Injuries to right lobe were mainly caused by road traffic accidents.(TABLE 1) Among the above cases, both right and left lobes were found to be affected in 8 cases. Front surface was the most frequent site(67%)followed by superior surface (40.9%). Right, posterior and inferior surfaces were affected in 19.3%, 6.8% and 21.6% respectively. More than one surface of liver was affected in 39.8 % of cases.

The lacerations were most commonly foundon the front surface in 49(55.6%) cases followed by superior surface 32(36.4%) cases, followed by contusion affecting front surface in 10 (11.4%) cases. The incised wounds were rare, was found in one case each, (1.1%) affecting the front and superior surface(TABLE 2).Out of total number of 73 cases (83%)of lacerations 36cases were found in road traffic occurrence (occupants), followed by pedestrians ,12cases. Contusions and incised wounds were seen in 16(18.8%) cases and 2(2.3%) cases respectively(TABLE 3).Contusions were easily detected if the liver was pale or fatty. Transcapsular lacerations were found to be the commonest 59 (80.8%) cases followed by subcapsular (PICTURE 1), 11 (15%)cases(FIGURE 1).The most common nature of disposition was found to be oblique in 34 (46.6%) casesfollowed by sagittal,found in 27 (37%)cases(FIGURE 2).The deepest wound was found to be more than 5cm seen in 19 cases(TABLE 4). In 8 cases, more than one litre of intra peritoneal haemorrhage was found(TABLE 5).

The direct force was associated with majority of liver injury cases 77 (87.5%), followed by transmitted force 10(11.36%)cases. Indirect force was observed in one(1.1%)case.In direct force,majority of cases were due to road traffic occurrence,in which 34 cases were occupants and the rest were pedestrians (16cases).

Table 1:- Lobes of liver affected in various types of accidents.

Nature of occurrence	Right lobe	Left lobe
Road traffic (pedestrian)	13 (16.7)	4 (22.2)
Road traffic (occupant)	39 (50)	7 (38.9)
Railway occurrence	10 (12.8)	4 (22.2)
Fall from height	6 (7.7)	2 (11.1)
Fall of objects on body	3 (3.8)	1 (5.6)
Injury with weapons	3 (3.8)	0 (0)
Injury by animals	1 (1.3)	0 (0)
Others	3 (3.8)	0 (0)
Total	78 (100)	18 (100)

Table 2:- Pattern of Liver injury and the surface affected.

Surface of the liver	Laceration n(%)	Contusion n(%)	Incised wound n(%)
Front	49 (55.68)	10 (11.36)	1 (1.14)
Superior	32 (36.37)	2 (2.27)	1 (1.14)
Right	17 (19.32)	0 (0)	0 (0)
Posterior	11 (12.50)	1 (1.14)	0 (0)
Inferior	21 (24)	3 (3.41)	0 (0)

Table 3:- Pattern of injury sustained to liver with respect to nature of occurrence.

Nature of occurrence	Laceration	Contusion	Incised wound
Road traffic (pedestrian)	12	4	0
Road traffic (occupant)	36	8	0
Railway occurrence	10	2	0
Fall from height	7	2	0
Fall of objects on body	3	0	0
Injury with weapons	1	0	2
Injury by animals	1	0	0
Others	3	0	0
Total	73	16	2
Percentage	83	18.18	2.3

Table 4:- Depth of injury and amount of intraperitoneal haemorrhage.

Depth of injury (in cms)	No of cases	No of cases with peritoneal haemorrhage>1000cc
0.1	11	1
>0.1-2	28	4
>2-5	17	3
>5	19	8
Total	75	16

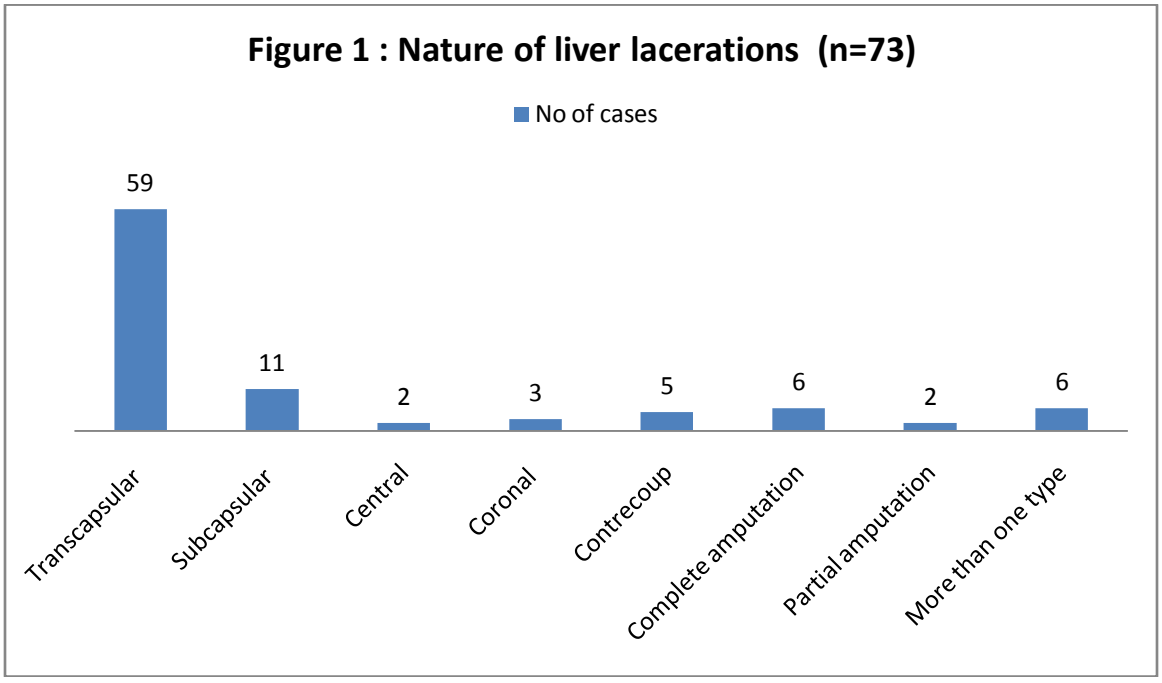
Table 5:- Period of survival and peritoneal haemorrhage.

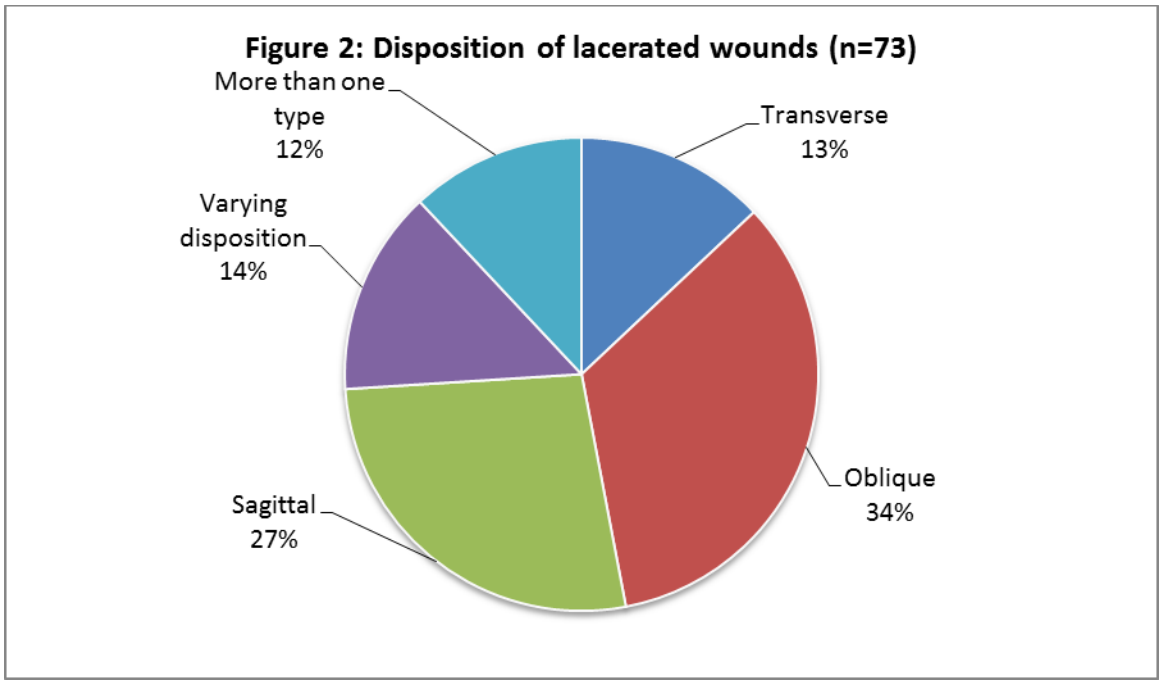
Period of survival (in hrs)	Frequency (%)	No of cases with peritoneal haemorrhage>1000cc
Death at site	29 (32.9)	1
>0-1	33 (37.5)	13
1-12	16 (18.2)	2
12-24	4 (4.6)	0
>24	6 (6.8)	0
Total	88 (100)	16

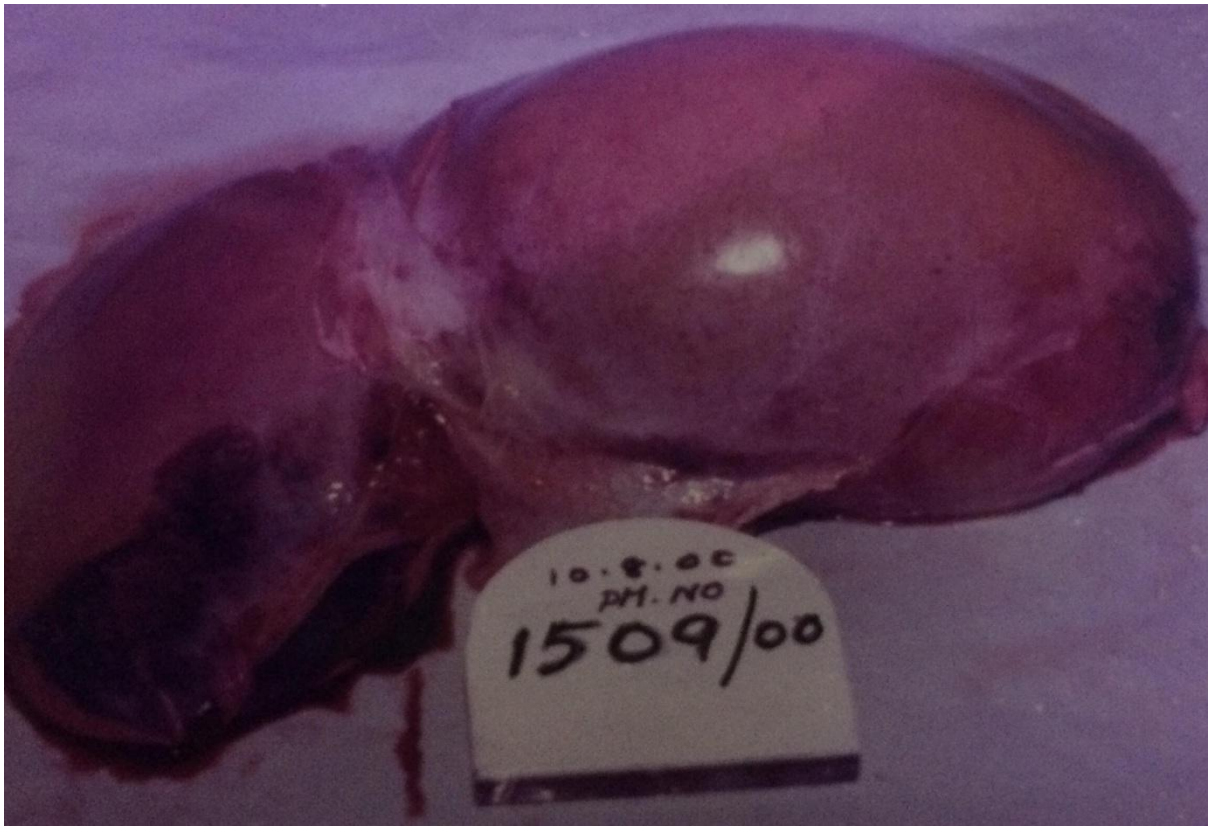
Table 6:- Comparison between the survival of the cases with the volume of peritoneal hemorrhage.

Categories	No: of cases survived		Total
Peritoneal hemorrhage	Less than 1 hour n(%)	More than 1 hour n(%)	
>1000 cc	14 (22.6)	2 (7.7)	16 (18.2)
<1000 cc	48 (77.4)	24 (92.3)	72 (81.8)
Total	62 (100)	26 (100)	88 (100)

Chi-square value = 2.7295, P-value = 0.09, Odds ratio = 3.5







Picture 1:- Subcapsularhaematomaof anterior surface of right lobe of liver in acase of road traffic accident.

Discussion:-

Blunt injuries to liver constituted 97.7% of cases. Manner of death was accidental in 88.6%, suicidalin 5.7%,homicidal in 3.4% and uncertain in 2.3% cases.In the present study,right lobe of liver was found to be far more affected than left, 88.63% and 20.5% respectively. Front surface was the most frequent site (67%)of injury

followed by superior surface (40.9%). This is in agreement with studies conducted byprabirchakraborthy[4] et al and nuwadatta subedi[5] et al.Traumatic amputation of liver was observed in 8(11%) cases and were assessed to be due to compression of liver .Gordon and Shapiro were of the opinion that liver contusions are difficult to recognize[6].But present study revealed it can be easily seen if the liver is pale or fatty.

According to Moritz there were 6 types of liver lacerations. All the 6 types were observed in our study also.Transcapsular lacerations were the commonest (80.8%) followed by subcapsular lacerations (15%). Non communicating central lacerations were seen in 2.7% of cases and coronal lacerations in 4.2% cases which were on the superior surface.Contrecoup lacerations were observed in 6.8% of cases. Most common disposition of liver laceration was oblique (46.6%) followed by sagittal (37%).Transverse lacerations were 17.8% others were 19.2% .This is in agreement with the observations of guharaj[7] and Mukherjee[8].

Intraperitoneal bleeding in hepatic lacerations was found to be directly proportional to the depth of laceration as observed by Mukharjee. The only complication following liver injury in the present study was bleeding. In the absence of peritoneal haemorrhage the patients survived upto one day or more.It was found that high proportion of subjects who survived less than 1 hour had more than 1000 cc peritoneal hemorrhage and vice versa. The risk for death was 3.5 times (Odds ratio) among liver injury cases with more than 1000 cc peritoneal hemorrhage compared to less than 1000 cc peritoneal hemorrhage. But this was not statistically significant (P = 0.09)(TABLE 6)

Direct violence(87.5%), indirect force(1.1%), and transmitted force (11.4%) was responsible for liver injury in the present study in six out of seven cases of fall from height the liver injury was due to direct impact and in only one case it was due to transmitted force. This is in disagreement with study done by Gooneteleke U.K.D.A[9].

Conclusions:-

Accidents dominated suicides with respect to liver injuries.Period of survival was inversely proportional to gravity of injury.The amount of blood in the peritoneal cavity depended upon the depth of liver laceration and period of survival.The most common pattern of injury was laceration followed by contusions. The commonest type of laceration was transcapsular and the commonest disposition was oblique followed by sagittal.Front surface of liver was found to be most vulnerable to trauma followed by superior surface.It was found that high proportion of subjects who survived less than 1 hour had more than 1000 cc peritoneal hemorrhage and vice versa .The right lobe of the liver was seen frequently involved both in penetrating and non penetrating trauma.Direct violence was the commonest mechanism of liver injury.

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