

Original Research Article

Spectrum of morbid anatomy of liver in autopsy cases

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ABSTRACT

Background: Purpose of autopsy is to learn the truth about the person's health during and how the person died. Thus, autopsy study provides valuable information about the disease. The main aim of the study was to know the spectrum of morbid anatomical changes in liver autopsy.

Methods: A prospective study was carried out on 100 liver specimens of autopsy cases comprising of 37 cases of roadside accidents, 17 of poisoning, 13 of burns, 10 of chronic illness, 7 each of hanging and head injury, 4 of myocardial infarction and 5 of death due to miscellaneous causes. Representative microsections of liver were evaluated for histopathological parameters like congestion, ballooning degeneration, hepatocellular necrosis, sinusoidal dilation, fatty change, bile stasis, fibrosis, lobular inflammation and portal inflammation.

Results: Out of total 100 cases, 77 were males and 23 females. Male to female ratio was 3.34:1. Hepatomegaly was seen in 15% of cases. Chronic venous congestion was the main histopathological diagnosis seen in 61% of the cases followed by chronic hepatitis in 12%, normal liver histology in 9%, hepatic steatosis and cirrhosis in 6%, granulomatous hepatitis in 2%, and sinusoidal congestion, portal triaditis and secondary neoplasm in 1% each.

Conclusions: Chronic venous congestion, chronic hepatitis, cirrhosis and hepatic steatosis were the common liver diseases identified. Autopsy study is useful to monitor the cause of death and to plan medical strategy. Histopathological examination of the liver is specialized learning tool to study the various diseases of liver which is a great value in improving the diagnosis.

Keywords: Autopsy, Liver, Morbid anatomy

INTRODUCTION

Autopsy of liver is very helpful in diagnosing silent liver diseases like steatosis, cirrhosis, chronic venous congestion, congenital lesions and malignant tumors. Majority of the chronic liver diseases may go unnoticed as may cause no clinical signs and symptoms. Liver diseases either may go undetected or not identified during health checkups or investigations required for other conditions or any surgery.¹

The medicolegal autopsy helps to find out diseases occurring in the liver about which the individual is not getting attention during his or her life time and never undergone for any diagnostic procedures due to lack of any symptoms. This examination served an important histopathological evidence to detect various changes occurring in liver and also helped the forensic experts to ascertain the cause of death.² Microscopic examination however, is still a very useful method to study the disease process.³ Autopsy of liver may show various abnormal findings like steatosis, metabolic liver diseases, secondary amyloidosis, hemosiderosis, simple cysts, infections like

amoebiasis, syphilis, tuberculosis, actinomycosis, hydatid cyst, chemical poisoning, cirrhosis and malignancy.⁴ Alcoholism is the most common predisposing factor which may lead to conditions like steatosis, alcoholic cirrhosis and chronic hepatitis. Any one of these disorders or all of them can occur at the same time, in the same individual.⁵

The main purpose of autopsy is to learn truth about the deceased's condition during and how the individual succumbs to death. Liver is the most common site for metabolic functions which is prone to get various type of injury due to exposure of chemicals, toxins and drugs. It is also the most common site for metastasis from the primary tumors especially from lung, gastrointestinal tract, melanomas and breast.⁶ This study was planned to know the spectrum of morbid anatomical changes in liver autopsy.

METHODS

A prospective study was conducted in the Department of Pathology in collaboration with the Department of Forensic Medicine from September 2012 to October 2014 in a tertiary care center of Haryana. One hundred liver specimens were studied in autopsy cases of different age groups received in the Department of Forensic Medicine. A complete informed consent was obtained in each case on a standard consent form from the next of kin of the deceased accompanying the dead body to the mortuary.

Inclusion criteria

All postmortem cases were included irrespective of cause of death.

Exclusion criteria

The cases with the duration of death more than 48 hours were excluded from the study so that the morphology of the organ was not altered due to putrefaction or decomposition.

Ethical approval was taken from the Institution ethics committee.

Gross examination of liver was done to note the size, weight, color, external appearance and any apparent abnormality of the organ. A minimum of four sections were taken from each lobe of liver and from abnormal areas, if any observed on gross examination. Liver tissue was fixed in 10% buffered formalin, processed and stained with hematoxylin and eosin, reticulin stain, periodic-acid Schiff stain and Masson's trichrome stain along with other special stains wherever required. Each liver tissue section was analyzed for histomorphological changes like congestion, ballooning degeneration, hepatocellular necrosis, sinusoidal dilation, fatty change, bile stasis, fibrosis, lobular inflammation and portal inflammation. Statistical analysis of the data was done at the end of study

using descriptive statistics including percentage and proportions. Data was entered in Microsoft excel 2010 after subsequent cleaning data was analyzed using statistical package for the social sciences (SPSS)-12 software and descriptive tables were made.

RESULTS

Current study included 100 cases, of which 77 (77%) were males and 23 (23%) were females. Male to female ratio was 3.34:1. Age ranged from 9 to 71 years. Mean age was 37.33 years. Maximum number of cases i.e. 24 were seen in the age group of 41-50 years, followed by 20 cases in the age group of 31-40 years, 19 cases each in 11-20 and 21-30 years and lesser number of cases 9 and 7 in the age group of 51-60 and 61-70 years. One case each was seen in the age group of 1-10 and 71-80 years (Table 1).

Table 1: Age and gender wise distribution of all 100 cases.

Age group (years)	Male (%)	Female (%)	Total
1-10	1 (100)	0 (0)	1
11-20	14 (73.6)	5 (23.7)	19
21-30	14 (73.6)	5 (23.7)	19
31-40	17 (85)	3 (15)	20
41-50	17 (70.8)	7 (29.2)	24
51-60	6 (66.6)	3 (33.3)	9
61-70	7 (100)	0 (0)	7
71-80	1 (100)	0 (0)	1
Total	77 (77)	23 (23)	100

Most common cause of death was roadside accidents i.e., 37 cases followed by poisoning-17 cases, burns- 13 cases, chronic illness-10 cases, 7 cases each of hanging and head injury, acute myocardial infarction- 4 cases and 5 cases of death due to miscellaneous causes. Maximum number (70%) of liver specimens were having normal weight between 1000 -1500 grams, followed by 15% of cases with increased weight >1500 grams, and 15% of cases had weight <1000 grams. Gross examination of liver showed nutmeg appearance (Figure 1), micronodular and macronodular cirrhosis (Figure 2), congestion and space occupying lesions in liver.



Figure 1: Liver specimen showing nutmeg appearance.



Figure 2: Specimen of macronodular appearance in cirrhosis of liver.

The most common histopathological changes observed in liver specimens were chronic venous congestion (61%) (Figure 3) and chronic hepatitis (12%) (Figure 4). Nine cases were histologically normal, followed by 8 cases of cirrhosis (Figure 5), 6 cases of hepatic steatosis, two cases of granulomatous hepatitis (Figure 6) one case each of secondary carcinoma, sinusoidal congestion, and portal triaditis (Table 2).

Cirrhosis was observed in males especially in older age group as compared to females. Mean age of presentation was 43.6 years.

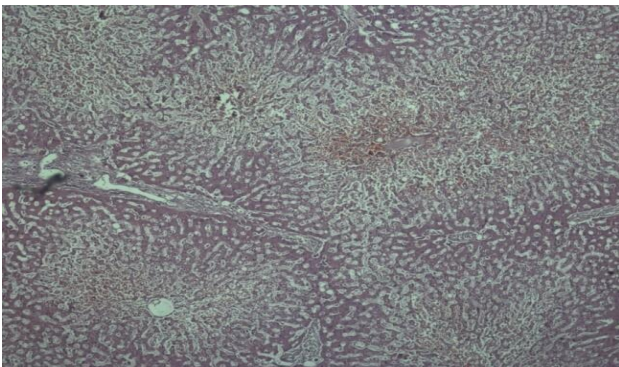


Figure 3: Changes of chronic venous congestion (40x; H&E).

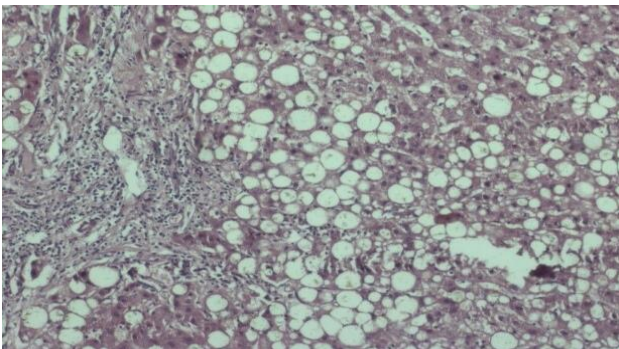


Figure 4: Hepatic steatosis with portal inflammation (100x; H&E).

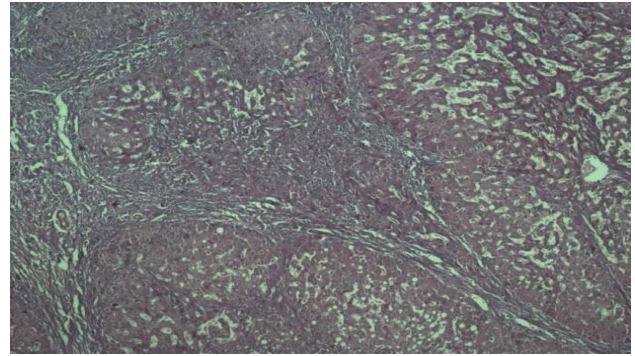


Figure 5: Regenerating nodules and fibrosis in cirrhosis (40x; H&E).

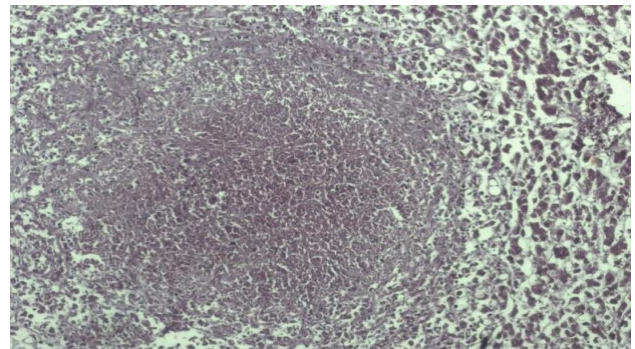


Figure 6: Granulomatous inflammation with caseation necrosis (40x; H&E).

Table 2: Histopathological diagnosis of all 100 cases.

Diagnosis	Male (%)	Female (%)	Total
Chronic venous congestion	44 (72.1)	17 (27.9)	61
Chronic hepatitis	12 (100)	0 (0)	12
Normal histology of liver	9 (100)	0 (0)	9
Cirrhosis	5 (83.3)	1 (16.7)	6
Hepatic steatosis	7 (100)	0 (0)	7
Granulomatous hepatitis	2 (100)	0 (0)	2
Carcinoma (secondary)	0 (0)	1 (100)	1
Sinusoidal congestion	1 (100)	0 (0)	1
Portal triaditis	1 (100)	0 (0)	1
Total	81	19	100

The main histopathological finding in burns was chronic venous congestion followed by sinusoidal congestion, portal inflammation, necrosis and ballooning degeneration.

Out of 17 cases of poisoning, 11 (64.70%) cases showed changes of congestion followed by ballooning degeneration (47.05%), sinusoidal dilation (41.17%),

perivenular necrosis (35.29%), portal inflammation, lobular inflammation, bile stasis and fatty change 29.41% each.

Ten cases (27%) out of 37 cases of roadside accidents showed changes of chronic venous congestion and 9 cases (24%) showed sinusoidal congestion.

Normal histological pattern was observed in 7 cases (18.9%), followed by chronic hepatitis in 6 (16.2%) and fatty liver in 2 (5.4%) cases.

Chronic venous congestion was the major histopathological change seen in cases of hanging followed by other minor changes like chronic hepatitis, fatty liver and normal liver histology which was seen in one case each. Chronic venous congestion was the most common histological change seen in cases of chronic illness. Two cases revealed changes of granulomatous hepatitis and one case each showed changes of fatty change, carcinoma (secondary), and chronic hepatitis. Cases of head injury revealed changes of chronic venous congestion and fatty liver only (Table 3).

Table 3: Histopathological diagnosis as per cause of death.

Diagnosis	Road side accidents (%)	Poisoning (%)	Burns (%)	Chronic illness (%)	Hanging (%)
Chronic venous congestion	10 (27)	13 (76.4)	13 (44.8)	3 (30)	4 (57)
Chronic hepatitis	5 (13.5)	1 (0.58)	-	1 (10)	1 (14.2)
Normal histology of liver	7 (18.9)	-	-	-	1 (14.2)
Cirrhosis	3 (0.8)	1 (0.58)	-	2 (20)	-
Hepatic steatosis	2 (0.5)	1 (0.58)	1 (3.4)	1 (10)	1 (14.2)
Granulomatous hepatitis	-	-	-	2 (20)	-
Carcinoma (secondary)	-	-	-	1 (10)	-
Sinusoidal congestion and dilation	9 (24.3)	1 (0.58)	17 (58.6)	-	-
Portal triaditis	1 (0.27)	-	6 (20.6)	-	-
Necrosis	-	-	6 (20.6)	-	-
Bile stasis	-	-	1 (3.4)	-	-
Total	37	17	29	10	7

Table 4: Comparative studies revealing histopathological changes in liver in cases of poisoning.

Study	Year	Congestion (%)	Fatty change (%)	Sinusoidal dilation (%)	Necrosis (%)	Portal inflammation (%)
Mehrpour et al ¹²	2008	68	22	-	-	-
Sutay et al ¹³	2005	45	36	9.07	9.30	-
Kundal et al ¹⁵	2014	45	33	8	9.30	-
Present study	2014	64.7	29.41	41.17	35.29	29.41

DISCUSSION

Liver is the most vulnerable and major organ in our body facing wide variety of problems like metabolic, toxic, microbial and circulatory disturbances. In some instances, the disease is primary while in others the hepatic involvement is secondary to cardiac de-compensation, alcoholism or extra hepatic infections.⁷ Most of the chronic liver diseases even in advanced stages may cause no prominent clinical signs and symptoms. They either go undiagnosed or are found incidentally during general checkups, investigation for other diseases or surgery. Hence, the underlying causes of such chronic liver diseases vary in different parts of the world and are based on various factors such as age, sex, socio-economic status, food habit, life style, locality and associated infections.⁸

Present study showed that liver diseases are not uncommon in the population of this Northern region. In this study, incidences were higher in 4th and 5th decade.

Similar age and sex wise distribution of cases was observed by Pathak and Mangal⁹. Studies performed by Bal et al and Fubara et al revealed that the commonest age group affected was 41-50 years (53.85%) and 41-49 years (28%) respectively which was comparable to the findings of the present study which revealed an incidence of 24% in the age group of 41-50 years.^{10,11} Males were more prone to death by diseases in 77% cases as compared to females 23%, the reason being that as males were bread earners and females usually doing household work, which may be attributed to the fact that alcohol consumption was reported in majority of the cases in male population, vulnerable to exposing risk factors on their respective occupation.

Seventeen cases were of poisoning with almost equal distribution of males and females. Maximum number of cases of poisoning were seen in 3rd to 4th decade in males while in female's equal incidence was observed in all age group ranging from 11-50 years.

Sinusoidal congestion, ballooning degeneration and sinusoidal dilation where the major histopathological findings identify in cases of poisoning followed by hepatocellular necrosis, portal inflammation, fatty change and bile stasis. Various authors Mehrpour et al, Sutay et al, Jain et al and Kundal et al showed similar findings in cases of poisoning mentioning 25-36% of fatty changes, while 45-100% cases of poisoning revealed sinusoidal congestion in our study (Table 4).¹²⁻¹⁵

Chronic venous congestion, sinusoidal congestion, sinusoidal dilation, portal inflammation, hepatocellular necrosis, ballooning degeneration and fatty changes were identified in cases of burns. Similar studies performed by various authors including Shinde et al and Rathod et al indicating increase incidence of changes of chronic venous congestion, necrosis, sinusoidal congestion and fatty change.^{16,17} Surprisingly majority of the cases were males comprising of 69.2% of all burn cases while females showed an incidence of 30.8% and 1st two decades age group was most commonly affected in burns. This reflects the preponderance of males in risk-taking activities at work and leisure but some studies reported the opposite findings as observed by Mzezewa et al.¹⁸

Our study comprised 37% cases of roadside accidents and it is well documented that alcohol abuse and traffic accidents are coherent. As traffic accidents lead to sudden death, so it is unlikely to have major histopathological changes in liver due to shorter survival span. In the present study, out of 37 cases which predominantly consisted males 33 (89.1%) who were in age group of 11-20 years and 31-50 years. Major histopathological changes in liver were chronic venous congestion observed in 51.3%, which may be due to the fact that CVC liver is the terminal end stage of the death in most of the liver autopsies, followed by chronic hepatitis (16.2%), cirrhosis (8.1%), fatty changes (5.4%) and normal liver histology seen in 18.9% of cases, may attribute to pre-existing liver diseases or history of alcohol consumption. Studies carried out by Alagarsamy et al also revealed that out of 35 cases of road side accidents fatty change was seen in 31.6%, hepatitis in 5% and normal histological findings in 52.1% cases.¹⁹ Whereas Selvi et al showed an incidence of 47.2% cases of roadside accidents which revealed changes of fatty change and congestion.¹ Fatty change was the predominant histological finding identified in 24% of cases of liver autopsies conducted on 503 cases of roadside traffic accidents by Hilden et al.²⁰

The underlying causes of chronic liver diseases vary in different geographic areas and are based on various factors such as socioeconomic status, life style, diet, local or regional infections and other endemic diseases.⁸ Various authors have shown that silent cirrhosis is not uncommon. One of the largest studies performed by Bethke and Schubert on 22000 autopsy specimens of liver over a duration of fifty years showed an incidence of 0.4-7.2% of cirrhosis.²¹ Pudale et al, Lee et al and Alagarsamy et al also observed an incidence of cirrhosis within the range of 7-

9% which was comparable to our findings with an incidence of 6%.^{19,22,23} Bal et al found cases of cirrhosis to be as high as 14% which was not comparable to our study, this increased incidence may be attributed to more alcohol consumption in Punjab, in and around Patiala.¹⁰

Majority of the cases of hanging showed chronic venous congestion as the major histopathological changes followed by changes of chronic hepatitis and fatty change. Selvi et al and Alagarsamy et al showed an incidence of 13.8% and 6% in cases of hanging which was comparable to our study revealing similar histopathological changes in liver.^{1,19}

Chronic hepatitis is usually due to hepatotropic viruses, or conditions like autoimmune chronic hepatitis or chronic idiosyncratic drug induced hepatitis. Chronic hepatitis was the second most common liver disease observed in our present study comprising of 12 cases. Similar findings were also reported by Kringsholm et al, Passarino et al, Ghazala et al, Fashir et al, Nibhoria et al, Ghosh et al and Selvi et al while a lower incidence was observed by Sotoudehmanesh et al and Das et al where hepatitis was in the range of 1-6%.^{1,24-31} Our study also showed increased incidence of chronic hepatitis which may be due to associated pre-existing lesions like viral infections.

Granulomas are frequently encountered in liver autopsies owing to its enriched vascular supply and their existence well capture the attention of clinicians and pathologists.^{32,33} Liver granuloma was a part of generalized miliary tuberculosis and deceased had an evidence of tuberculosis in liver and other organs especially lungs. Primary tuberculosis of liver is very uncommon because low oxygen tension in liver is unfavorable for growth of mycobacteria as stated by Wu et al.³⁴ A high incidence i.e. 42% of granulomatous inflammation was observed by Amrapurkar and Aggarwal.³⁵ One of the largest studies on 9952 liver autopsies carried out by Murthy et al revealed a remarkable increase incidence of 30.5% in cases of disseminated tuberculosis.³⁶ Cunningham et al also performed a study comprising of large number of liver biopsy and autopsies and showed granulomatous hepatitis in the range of 2-10%.³⁷ We encountered only two cases of granulomatous hepatitis which were attributed to miliary tuberculosis, primary focus being in lungs. Other studies also revealed a variable incidence in the range of 0.2% to 3.1%.^{5,8}

Present study does not reflect the actual pattern of liver diseases as it was conducted on small number of autopsy specimens of liver. A larger study is required to establish the actual pattern of liver diseases in general population in this region.

CONCLUSION

It was concluded from the study that chronic venous congestion, chronic hepatitis, cirrhosis and hepatic steatosis were the common liver diseases identified in this

area. Silent liver diseases are very common amongst the apparently healthy individuals and if not detected early, some of these conditions may lead to serious consequences. Histopathological examination of the liver is specialized learning tool in the hands of experienced histopathologists to study the various diseases of liver which is a great value in improving the diagnosis and helping hand in deciding the treatment and further management.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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