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Study of Histopathological Changes in Liver And Kidney in Cases of Deaths Due to Burn Injuries Conducted At RIMS, Ranchi, Jharkhand

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Abstract :
Introduction: *Amongst the different cases of unnatural deaths encountered in day to day medicolegal practice, deaths due to different causes of burn are very important.The present study encompasses only those cases of burn where thermal injury is the responsible factor. Effects due to thermal burns depend on : (a)the degree of heat (b)the duration of exposure (c)the extent of surface (d)the site (e)age (f)sex. In this study we aim to analyze the detailed macroscopic or naked eye changes in liver and kidneys in cases of deaths due to burn injury and side by side giving reflection of microscopic changes depending upon the factors that influence the outcome of a case of burn injury.*
Material and Method: *Materials for the present study were collected from the medico legal autopsies of 302 burn cases , performed at the mortuary of Rajendra Institute of Medical Sciences (RIMS), Ranchi, during the period from October 2015 to September 2016.*
Results: *In our study the histopathological changes as observed on postmortem examination were as follows, in 40 cases (40%) showed congestion of the liver. It was associated with generalized congestion of all internal organs and the cause of death is shock due to burns. Necrosis (centrilobular, focal and periportal) comprised 13 cases (13%). Fatty changes in the liver were observed in 2 cases (2%). Varying amount of fat was present in hepatic cells. Fatty changes were centrilobular or perilobular and were scattered or diffused in distribution. Extent of fatty changes was related with higher extent of burnt body surface area. Histopathological examination of kidneys showed congestion in 84% cases. Microscopic examination of these revealed normal histology of kidney in 40% cases, 9% slides were shown interstitial oedema, , 2% of slides were of Tubular degeneration and 1% slides were of pyelonephritis. Others were of mixed histology.*
Conclusion:- *Our study underlined prime importance concerned with histo pathological studies of liver and kidneys in burn cases.*

Keywords : *Burn, liver, kidneys, histopathology, congestion*

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I. Introduction

Burns are the second leading cause of accidental death, following vehicle crashes[1]. Burn injuries are very common in developing countries due to high population density, domestic accidents, poverty, illiteracy, lack of appropriate safety measures, negligence in certain working environment and unsafe use of materials associated with festivals (fireworks)[2]. The exact number of burns is difficult to determine, but various studies suggest that India with a population of over one billion has 700,000-800,000 burns admissions annually[3]. The magnitude of deaths due to burns is so large as India is the only country in the world where fire is classified among the fifteen leading causes of death in 1998 standing fourteenth in the list[4]. In burn patients, sepsis and its related complications are the leading cause of mortality followed by irreversible shock and inhalation injury[4]. Mortality increases with the severity of the burn injury and with increasing age of the patient[5]. Histopathological examination is commonly asked by autopsy surgeon to establish the cause of death when he recognizes any morbid anatomical changes in tissues and suspect that it may be the reason for cessation of vital functions of the deceased. The present study is undertaken to find out various histopathological changes in liver and kidney in different types of burns includes thermal, electrocution and chemical. This is important as there are only few studies are conducted in this regard till now. It will be of immense help for further research.

II. Materials And Methodology

A cross-sectional descriptive study was conducted over a period of one year from October 2015 to September 2016. The sample size was 100 (one hundred)out of 302 burn cases in a period from October 2015 to September 2016 and was chosen randomly depending upon the inclusion and exclusion criteria. Every alternate subject was taken from both the study population with a random start by systematic random sampling. Study conducted on specimens of major organs like Liver and kidney of burn deceased received in the Department of FMT, RIMS, Ranchi, Jharkhand in collaboration with the Histopathology department, RIMS, Ranchi, Jharkhand. Data like age, gender, type of burn were collected from hospital record. All the specimens were presented in 10% formalin for fixation. In histo-pathological examination, number of sections was taken from different sites according to size of specimen. Then these representative sections were subjected for processing and automatic tissue processor. After processing the section were embedded in paraffin, cut with microtome at 5 mm thickness and stained with hematoxylin and Eosin (H&E). Special staining procedure like Periodic Acid Schiff (PAS) was done as and when required. All relevant data recorded were analysed by using SPS2010 software. Chi Square was used as a test of significance.

2.1 Inclusion criteria:

1. All cases of deaths due to burn injuries coming for
2. Cases considered for study will include subjects of all age group of all genders.

2.2 Exclusion criteria:

1. Highly decomposed bodies
2. Charred and nearly completely burnt bodies

III. Results

1. Distribution of study population according to the macroscopic or naked eye features of liver(n=100)

Macroscopic features	Number of cases	Percentage
Normal	48	48
Congestion	40	40
Pale	3	3
Granular	8	8
Pus	0	0
Cyst/SOL	1	1
Total	100	100

2. Distribution of study population according to the histopathogical changes in liver(n=100)

Histological findings	Number	Percentage
L1	37	37
L2	20	20
L3	2	2
L2+L8	6	6
L2+L10	2	2
L3+L7	5	5
L2+L4+L11	2	2
L2+L5	2	2
L2+L5+L8	1	1
L4+L7	1	1
L6	5	5
L2+L9	10	10
L5+L6	2	2
L2+L4+L5	2	2
L7+L10	1	1
L2+L4	1	1
L2+L3+L8	1	1
Total	100	100

Abbreviations:L1=Normal,L2=Congestion ,L3=Fatty change,L4=Portal inflammation ,L5=Focal haemorrhage,L6=Infarction, L7=Degenerative changes,L8=Dilated and congested sinusoids ,L9=Centrilobular necrosis,L10=Focal necrosis,L11=Periportal necrosis.

2. Distribution of study population according to the macroscopic or naked eye features of kidneys(n=100).

Macroscopic features	Number of cases	Percentage
k1	4	4
k2	84	84
k3	4	4
k4	0	0
k5	0	0
k6	0	0
k2+k4	2	2
k3+k4	6	6
Total	100	100

Abbreviations:k1=Normal,k2=congestion,k3=pale,k4=Granular,k5=pus,k6=Cyst/SOL,k2+k4=congestion+ granular,k3+k4=pale+granular

4. Distribution of study population according to the histopathological findings of kidneys(n=100).

Histopatholgical findings	Number of cases	Percentage
D1	40	40
D2	9	9
D4	2	2
D3+D8	11	11
D2+D3	9	9
D2+D3+D4	10	10
D3+D4	6	6
D2+D3+D8	4	4
D4+D6	2	2
D7+D8	1	1
D9	1	1
D4+D6+D7	2	2
D3+D4+D7	1	1
D2+D4+D5	2	2
Total	100	100

Abbreviations:D1=Normal, D2=Interstitial Odema,D3=Congestion ,D4=Tubular Degeneration, D5=Tubular regeneration ,D6=Vascular sclerosis ,D7=Glomerular Degeneration ,D8=Tubular necrosis,D9=Pyelonephritis

IV. Discussion

Macroscopic or naked eye features in liver

As shown in TABLE 1, The macroscopic or naked eye features were included in study of liver were , congestion ,paleness ,granularity ,pus and Cyst/SOL. Out of these features 48% cases were shown Normal liver,40% cases with congested liver,8% of cases were consists of granular kidney,3% cases were included pale liver consistency, and 1% cases were shown to have Cyst/SOL.

Histopathological findings in the liver

As shown in the TABLE 2, The following histopathological findings were seen in liver from slides prepared from death due to burn injury included, congestion, fatty change, Portal inflammation , Focal haemorrhage ,infarction ,degenerative changes in liver ,Dilated and congested sinusoids, Centrilobular necrosis ,Focal necrosis, Periportal necrosis etc. Out of these 37% of slides were shown normal histology of liver, 20% slides were shown congested liver,10% of slides were with presence of congested liver with Centrilobular necrosis, 6% cases were consists of congested liver with dilated and congested sinusoids,5% cases were shown to have infracted liver,5% of cases were also shown to have histological features of fatty change and degenerative changes in liver. Others features which were included 2% cases of each 1) fatty change in liver 2) both congestion and focal necrosis features 3)congestion+ Portal inflammation+ Periportal necrosis 4)congestion+focal haemoorhage 5)Focal haemorrhage+Infarction 6)congestion +portal inflammation +focal haemorrhage ,1% cases of each were shown I)congestion+portal inflammation II)congestion+fattychange+dilated and congested sinusoids III)congestion + focal haemorrhage +dilated and congested sinusoids IV)Portal inflammation + degenerative changes V) Degenerative changes +focal necrosis. In liver the histological findings were seen in all range from cloudy swelling , sinusoidal congestion ,and haemorrhage to necrosis and infarction . Focal areas of necrosis involving individual lobules were found , the necrotic area being central and mid zonal in distribution , with viable liver cells around the portal areas . **Argamaso et al**[7] suggests similar finding in liver. Microscopically as in the cases of **Wilson, Macgregor, & Stewart**[8] there was a focal necrosis and varying degrees of fatty degeneration. The similar necrotic changes

have been described by the study ,**Duffin et al[9] & Shinde et al[10].** The actual cause of liver necrosis in case of burns is obscure, but it is difficult to conceive of its being due to anything other than circulating toxin , elaborated either in burned tissue or elsewhere as a result of the presence of burned tissue. Despite studies by numerous workers, however, the exact nature of this hypothetical agent is still undetermined.

Macroscopic or naked eye features in kidney

As shown in TABLE 3, the macroscopic features or appearance of kidney were included the parameters congestion, pale kidneys, granular, pus, and kidneys with Cyst/SOL . Out of these macroscopic features 84% of cases were of congested kidney ,4% were of normal appearance,4% were pale in consistency,6% of cases were shown mixed features of paleness and granularity,2% of cases were found to be present with mixed features congestion and granularity both.

Histopathological findings in kidneys

As shown in TABLE 4, the histopathological findings in kidneys were seen in slides prepared from death due to burn injury, included Normal kidney, interstitial oedema, Congestion, Tubular degeneration, Tubular regeneration ,Vascular sclerosis , Glomerular degeneration ,Tubular necrosis , Pyelonephritis etc. Out of these 40% of slides prepared shown normal histology of kidney ,9% slides were shown interstitial oedema, , 2% of slides were of Tubular degeneration and 1% slides were of pyelonephritis. Other were of mixed histology , 1)9% slides were consists of congestion +interstitial Oedema 2)10% slides were of Congestion+ interstitial Oedema +Tubular degeneration 3)6% were of congestion +Tubular degeneration histology 4)11% slides were consists of congestion +Tubular necrosis histology 5)2% slides were shown Tubular degeneration +Vascular sclerosis 6)2% slides were also consists of Tubular degeneration +Vascular sclerosis + Glomerular degeneration 7)1% slides were shown mixed feature of Congestion+ Tubular degeneration + Glomerular Degenaration 8)2% slides were consists of Interstitial Oedema + Tubular degeneration +Tubular regeneration 9)4% slides were shown congestion+ interstitial oedema +Tubular necrosis histology 10)1% slides were consists of Glomerular degeneration + Tubular necrosis histology. Tubular necrosis , cloudy degeneration and infective nephritis were common findings observed in kidney is close to the study of **Argamaso et al[7]** and **Shinde et al[10].** Tubular necrosis occurs due to ischemia or blockage of tubule by tubular casts. Also extracellular dehydration after burn injury leads to renal changes .

V. Conclusion

Researcher regarding histopathological changes in internal organs of thermal burns death were not much done, particularly in our country .However, the two published works on the said topic have helped the present study a lot[10,11]. The present day study has generated a statistics, which in some parts is not at par with conventional textbooks. But it is the actual observation and as such demands more extensive study involving a larger study population ,over a long period of time.

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