PATHOMORPHOLOGICAL CHANGES IN VITAL ORGANS OF BUFFALOES *(BUBALUS BUBALIS)* NATURALLY INFECTED WITH LEPTOSPIROSIS

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ABSTRACT

The pathological aspects of leptospirosis were studied in 7 buffaloes with a conclusive diagnosis of the disease, as confirmed by MAT. Main necropsy lesions in kindey included congestion, few shrunken/atrophied glomeruli, periglomerular infiltration of mononuclear cells, tubular degeneration and cast in tubular lumen were common findings. The hepatic lesions were characterized by distortion/disruption of hepatic cord, individualization of hepatocytes, varying degree of degenerative/necrotic changes in hepatocytes, presence of stray necrotic foci, mild congestion and mononuclear cell infiltration in portal areas. Pulmonary lesions comprised of congestion, focal area of alveolar edema, alveolar consolidation, emphysema, mononuclear cell infiltration in peri-bronchial/bronchiolar areas and foci of interalveolar thickened septae. Varying degree of congestion, lymphocytic depletion and hemosiderine pigment depositions were the histopathological features of splenic lesions.

Keywords: *Bubalus bubalis*, buffaloes, leptospirosis, MAT, pathomorphology

INTRODUCTION

Leptopsirosis is caused by spirochetes belonging to genus Leptospira. In rare instances leptospirosis can be fatal but it cause economic losses due to abortion, still birth, infertility and decrease milk production. Non- specific diseases characterized by fever, jaundice, anorexia and lethargy may also occur. Though, kidneys and liver are considered as main target organs for pathological point of view as well as transmission of leptospirosis through urine. In the present study pathomorphological changes in leptospirosis are evaluated in kidneys, liver, lung and spleen collected from Slaughter House.

MATERIALS AND METHODS

Morbid materials (n=50) was collected from

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buffaloes slaughtered at Municipal Corporation Slaughter House, Surat. At Slaughter House due care was take while collecting organs like kidneys, liver, lungs and spleen from the carcass of the corresponding animals whose blood was collected earlier during slaughter. Gross lesions, if any, in above mentioned organs were recorded and tissue samples fixed in 10% neutral buffered formalin. These materials were subsequently used for histopathological study (Luna, 1968) and Warthin-starryspecial stainingtechnique (Prophet *et al*., 1994) for leptospires. For pathomorphological study only MAT positive animals were taken into consideration. Out of 50 buffaloes only 7 were found to be MAT positive. As such morbid materials collected from these 7 buffaloes were subjected to pathomorphological studies.

RESULTS

Gross

No gross lesion of any pathological significance was observed in kidneys, liver, lungs and spleen of these animals.

Hostopathology kidneys

Most of the glomeruli appeared apparently normal but the presence of a few shrunken/ atrophied glomeruli. Some of glomeruli were congested while in others periglomerular infiltration of mononuclear cells seen (Figure 1). Tubular degeneration/necrotic changes of varying degree of lining epithelia and their individualization were the common findings which resulted in desquamation of tubular lining epithelia forming cast in tubular lumen (Figures 1 and 2). Some of the tubules were represented by basement membrane only due to complete denudation of lining epithelia. In addition mononuclear cell infiltration mainly lymphocytes and a few plasma cells were found in the tubulointerstitial spaces in the vicinity of both the damaged and apparently normal tubules without any fibroplastic reaction (subacute interstitial nephritis). In a few cases aggregates of mononuclear cells in follicular form were also seen. The severity of the lesions varied in different cases but the basic pattern of the lesions was same in all the cases studied.

Liver

The hepatic lesions were characterized by distortion/disruption of hepatic cord, individualization of hepatocytes, varying degree of degenerative/necrotic changes in hepatocytes, presence of stray necrotic foci, mild congestion and mononuclear cell infiltration in portal areas of the liver (Figure 3, 4 and 5).

Lungs

Pulmonary lesions comprised of congestion, focal area of alveolar edema, alveolar consolidation, emphysema, mononuclear cell infiltration in peri-bronchial/bronchiolar areas and foci of interalveolar thickened septae (Figure 6, 7 and 8).

Spleen

Varying degree of congestion, lymphocytic depletion and hemosiderine pigment depositions were the histopathological features of splenic lesions.

Microsections stained with Modified Warthin Starry special staining did not revealed structures comparable to leptospires in any case.

DISCUSSION

In the present study no gross lesion was

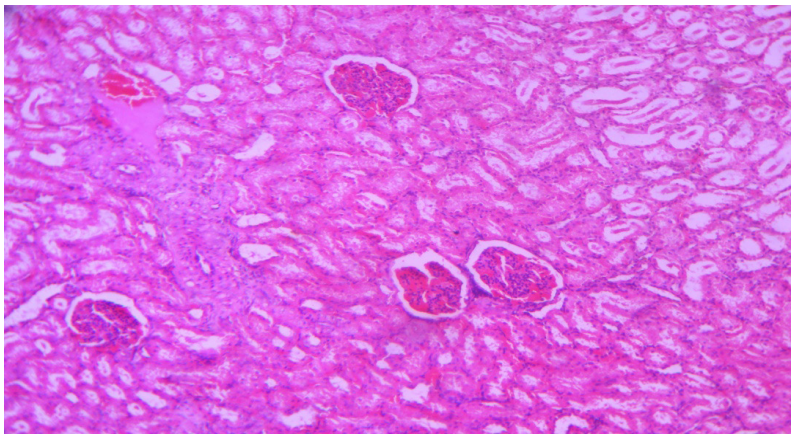

Figure 1. Kidney: Glomerular congestion and presence of casts in tubular lumen. H & E x100.

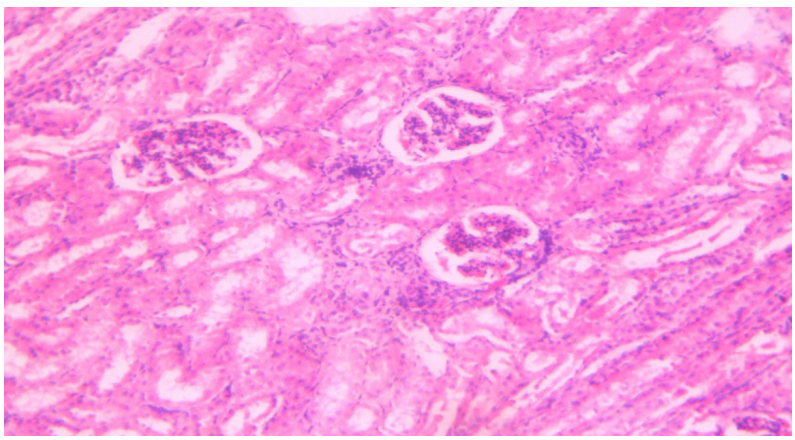

Figure 2. Kidney: Varying degree of tubular degeneration/necrosis and infiltration of mononuclear cells in periglomerular area. H & E x100.

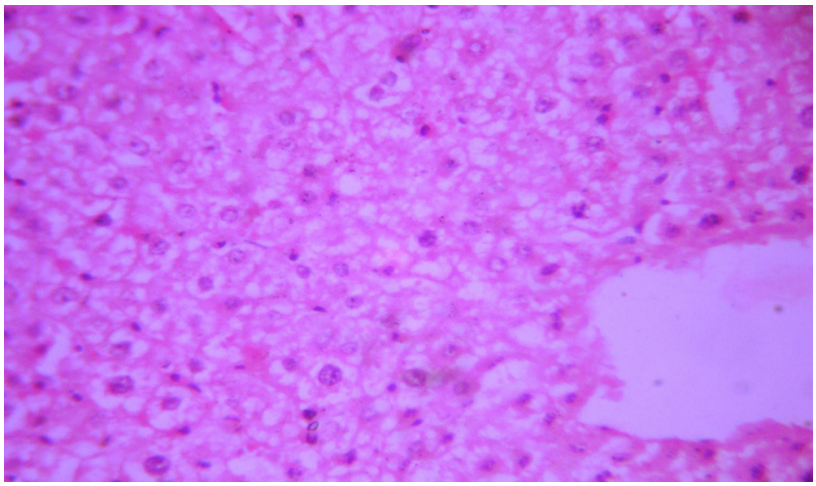

Figure 3. Liver: Varying degree of degenerative changes in hepatocytes, H & E x400.

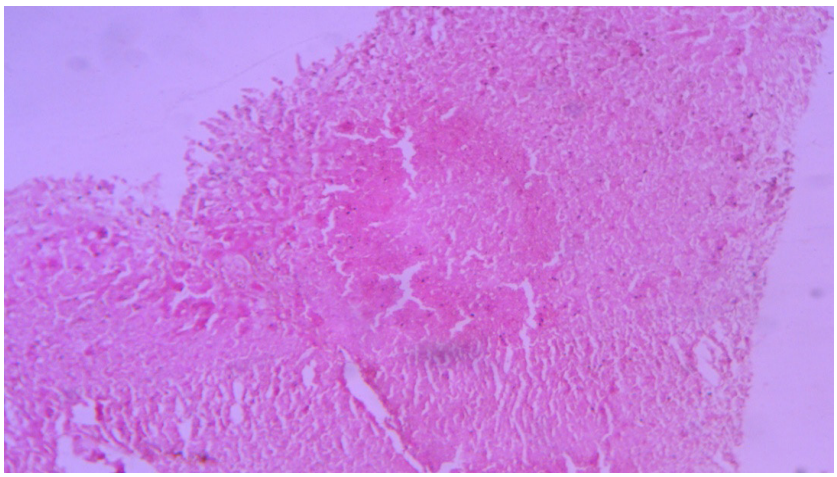

Figure 4. Liver: Solitary necrotic focus. H & E x40.

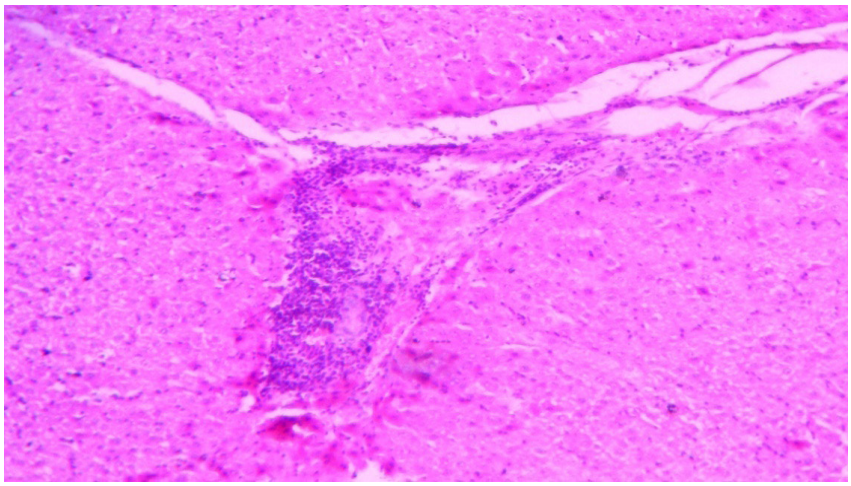

Figure 5. Liver: Mononuclear cell infiltration in portal area. H & E x100.

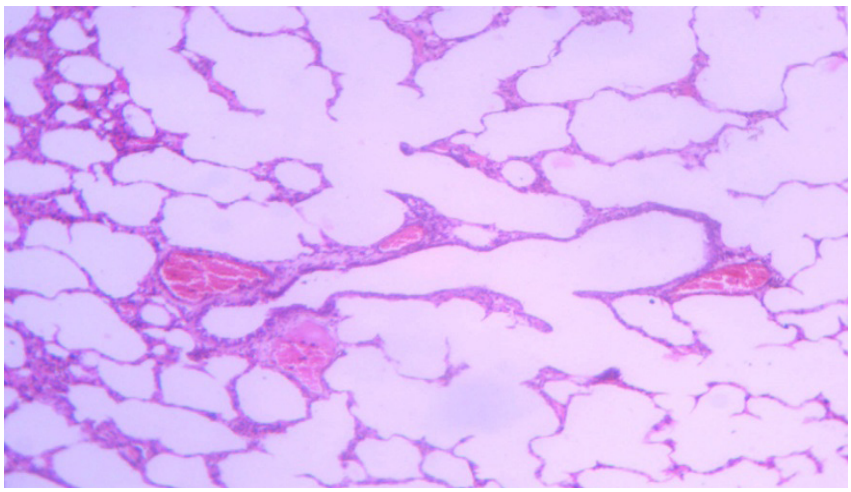

Figure 6. Lung: Congestion and emphysema. H & E x100.

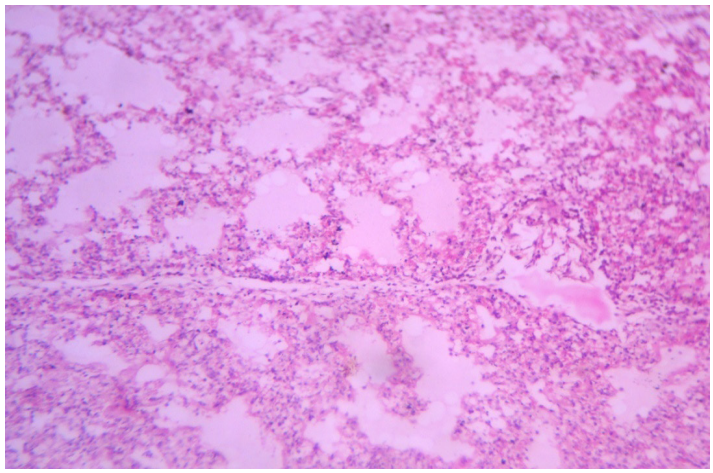

Figure 7. Lung: Edema and alveolar consolidation H & E x100.

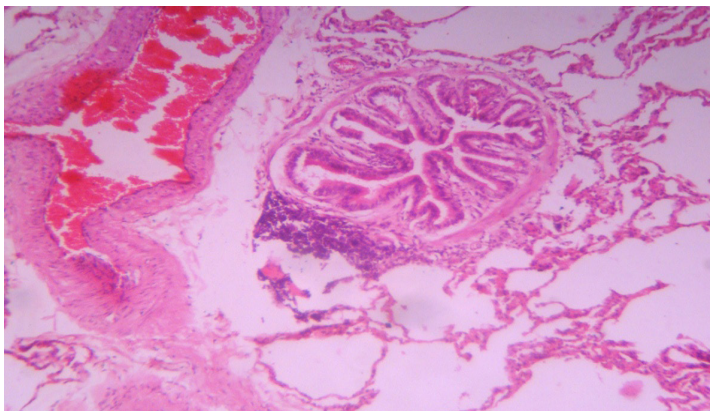

Figure 8. Lung: Peribronchiolar mononuclear cell infiltration. H & E x100.

observed in any organ of leptospira MAT positive cases. Almost similar observation were reported by Yener and Keles (2001) who studied 68 white-spotted and 30 apparently normal kidneys in slaughtered cows for detection of leptospira using histopathology and immunohistochemistry. *Leptospira interrogans* antigen was found in 21 out of 68 white-spotted kidneys and 4 out of 30 grossly apparently normal kidneys.

Macroscopic lesions in bovine leptospirosis consist of multifocal white spots (1.00-5.00mm) in the renal parenchyma. These lesions reflect multifocal interstitial nephritis, which is commonly found in the kidneys of cows infected with leptospires (Bharti *et al*., 2003; Jubb *et al*., 2008; Azizi *et al*., 2012) but these lesions are not specific for leptospirosis alone because comparable lesions occur in the kidneys of cows infected by *Septicaemic colibacillosis* (Barker *et al*., 1993), salmonellosis or brucellosis (Maxie, 1993) and malignant catarrhal fever (McGavin and Zachary, 2007).

The pathomorphological lesions observed in the present study were in accordance with earlier findings made in kidneys (Silva *et al*., 2005; Mineiro *et al*., 2011; Azizi *et al*., 2012), liver (Mineiro *et al*., 2011), lungs (Pereira *et al*., 1998; Mineiro *et al*., 2011) and spleen (Fehlert *et al*., 2000). Hemolysin results in the release of hemosiderine pigments in the spleen and would have been due to vasculitis with capillary injury (Farr, 1995; Farrar, 1995).

Contrary to these some of the earlier workers did not find any supporting lesions of leptospirosis in various organs of cattle/rats, though these were positive cases of leptospirosis (Silva *et al*., 2005; Tucunduva de Faria *et al*., 2007).

In the present study we could not detect structures comparable to leptospires in any organ (kidneys, liver, lungs and spleen) on Warthin Starry staining and supported the view of some of the workers who opined that leptopsires are not always detected by Silver impregnated stains. (Langham *et al*., 1958; Silva *et al*., 2005; Jones *et al*., 2006; Mineiro *et al*., 2011). On the other hand a number of workers have demonstrated leptospires in various tissues of different animals (Leon *et al*., 2006; Mineiro *et al*., 2011; Fornazari *et al*., 2012).

Involvement of kidneys in all the present cases was suggestive of the fact that the kidneys are the site of predilection for leptospires as agreed upon by different workers world over. Hepatic and pulmonary lesions developed were linked with the multiplication of organisms during leptospiremic/ acute phase as liver has been considered to be the second most common organ involved (Greene *et al*., 2006). With the development of antibodies leptospires are eliminated from the liver and most other organs but their localization continues in kidney tubules (Oliveira *et al*., 2005). The type of reaction and its intensity observed presently/ reported in past in different organs were mostly degenerative and inflammatory in nature which could have been due to leptospiral toxins circulating in the body as occurring in a number of infectious diseases. However, morbid materials utilized in this study were from MAT positive/seropositive animals only so we consider the changes observed presently were representative of leptospirosis.

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