Website : www.asthafoundation.in
Progressive Research : An International Journal
Vol 19 (1) : 37-39 (January-2024), Print ISSN : 0973-6417, Online ISSN : 2454-6003
Society for Scientific Development in Agriculture and Technology, Meerut (U.P.) India

Histopathological Studies on Glomerulonephritis in Pig

Shobha Burdak*, Indu Vyas, Hemant Dadhich, Manisha Mathur, Manisha Mehra, Shesh Asopa, Pradeep Makawana and Renu

[1]*Department of Veterinary Pathology, RAJUVAS, Bikaner, Rajasthan, India*

**Email : shobhaburdak011@gmail.com*

Abstract

Present study of five hundred and eighty six kidney specimens was undertaken to elucidate the pathology of renal disorders in pig (*Sus scrofa domesticus*) irrespective of age, sex and breed at organised and unorganised form of Bikaner, Jaipur and Alwar districts of Rajasthan. Out of these, total 154 specimens of kidneys showing macroscopic lesions brought to the Department of Veterinary Pathology, Bikaner and were processed for further pathological examination. In which, acute glomerulonephritis, subacute glomerulonephritis and chronic glomerulonephritis 13,9,5 cases respectively was reported. In acute glomerulonephritis, kidneys were found to be enlarged and pale. Glomerulus was ischaemic and cellularity of the glomeruli was increased. In sub-acute glomerulonephritis, the kidneys were large white due to enlargement and glomerular capillaries were hyperaemic, and proliferation of endothelial and epithelial cell was more pronounced. In chronic glomerulonephritis, kidneys were shrunken and contracted with fine granular surface, capsule was adherent and the glomeruli were fibrosed leading to decreased cellularity of glomerular tuft. Septicaemic infection may increase chances of glomerulonephritis.

Key words : *Pigs, kidneys, histopathology, glomerulonephritis.*

Introduction

Pig raising is adopted as compensable adjunct to the farming of other livestock (1). Pigs have higher prolificacy, faster growth rate and higher meat conversion ratio etc., which thrive in pig farming. At present, pigs are being established as large animal models for human diseases (2). Pig farming play a significant role in the economy of marginal owners and poor pig raisers (3). Pigs are constantly subjected to a wide variety disorders which affects their urinary system, in which kidney disorders are more frequent and are most often associated with huge economic losses due to the fact that they will reduce litter sizes, causes poor growth and reducing the rate of weight gain (4). Pathological study in the kidney of pig gives a guideline for diagnosis of renal diseases. Histopathological study revealed acute glomerulonephritis, subacute glomerulonephritis and chronic glomerulonephritis in 8.44, 5.84, 3.25 per cent specimens, respectively. Glomerulonephritis is the inflammation of the glomerular tuft. It may acute or subacute or chronic and in either of the event, may be focal or diffuse. The kidneys became pale and enlarged with potential haemorrhages, oedema of glomeruli, congestion and infiltration of inflammatory cells. In advanced cases, thrombosis and necrosis of glomerular capillaries is also observed. Glomerulonephritis may be observed in animals died due the infectious diseases like streptococcal infections, hepatitis, endocarditis, etc. and toxicities also.

Materials and Methods

For the proposed interrogation, samples of the kidneys of pig (*Sus scrofa domesticus*) irrespective of age, sex and breed were collected from various organised and unorganised slaughter houses of Bikaner, Jaipur and Alwar district of Rajasthan. During post-mortem examination, the samples were thoroughly examined grossly for any alterations in morphology in terms of size, shape, colour, location, consistency and presence of cysts, abscesses, tumours, other growths and lesions etc. and screened by visual examination and gross palpation. The kidney tissue specimens were collected from the carcasses of pig, submitted to the Department of Veterinary Pathology, college of Veterinary Science, Bikaner. Following collection, all the kidney samples were properly preserved in 10 per cent formalin after cutting the affected parts and whole organ. The parts of affected tissue measured 2-5 mm thickness and presenting the lesions with normal tissue were used for fixation and further histopathological examination. For histopathological examination, processing of tissues was done by paraffin embedding using acetone and benzene technique (5). The tissue sections of 4-6 micron thickness were cut and stained with routine staining method of hematoxylin and eosin staining. (6, 7). Following deparaffinization, the sections were dehydrated using serial changes in ethanol and stained using Harris haematoxylin. After differentiation and follow up staining with Eosin, the slides were dehydrated and then

Received : January-2024; Revised : January-2024; Accepted : January-2024

permanently mounted using DPX. As far as possible, results were recorded by gross observations and microscopic examination.

Results and Discussion

Acute glomerulonephritis was recorded in 13 (8.44 per cent) cases. Grossly, in this condition the affected kidneys were found to be enlarged and pale. Tense capsule was found which peeled off easily. On the cortex, petechial haemorrhages were seen. Glomeruli were visible as fine red dots. Microscopically, hyperaemia of glomerular capillaries and proliferation of endothelial and epithelial cell was evident. Cellularity of the glomeruli was increased. Severe infiltration by inflammatory cells was noticed. Leucocytes, erythrocytes, swollen tuft and precipitated protein occupied the capsular space (Fig.-1). The findings of present investigation are in accordance with that of (8,9,10).

Sub-acute glomerulonephritis was recorded in 9 (5.84 per cent) cases. Grossly, the kidneys were "large white" appeared. Kidneys were found to be pale and soft with smooth surface and loose capsule. The capsule was tense and had numerous cortical petechiae with yellowish- grey colour of cortex. Microscopically, glomerular capillaries were hyperaemic. The proliferation of epithelial cells of the parietal layer of Bowman's capsule, which formed epithelial crescents. Fatty degeneration occurred in tubular epithelium which eventually leads to hyaline droplet degeneration and necrosis. Oedematous interstitial tissue was filled up by infiltrated inflammatory cells and some collagenous tissue. The thickened basement membrane became permeable to proteins (Fig.-2). Similar findings were also observed by (11,12,13,14).

Chronic glomerulonephritis was observed in 5 (3.25 per cent) cases. Grossly, in this condition, kidneys were shrunken and contracted with fine granularity of the capsular surface. The capsule was found to be adherent and when removed some of the cortex peeled off. The cortex was found to be narrower and markings are obscured. Microscopically, the glomeruli were fibrosed leading to decreased cellularity of glomerular tuft. The tubules were replaced by scar tissues. The tubules which were connected to functional glomeruli were dilated. In adjacent renal parenchyma, fibrosis along with lymphocytic infiltration was found. These findings were in close resemblance with that of (11,15,16,17,18).

Conclusion

Glomerulonephritis might be caused by various septicaemic infection, tumour (*Malignant lymphoma*) or viral infection.

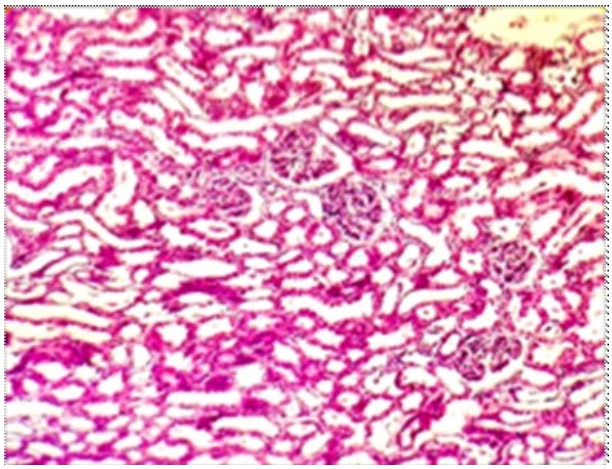

Fig.-1 : Microphotograph of kidney showing acute glomerulonephritis, increased cellularity of glomerular tuft and severe infiltration of polymorphonuclear leucocytes. H & E -100x.

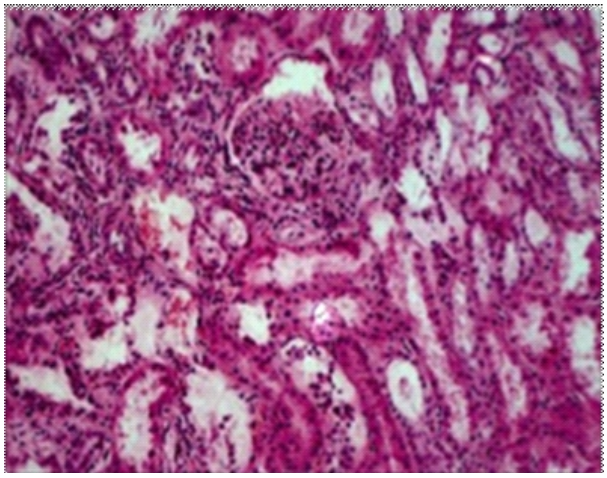

Fig.-2 : Microphotograph of kidney showing glomerulonephritis, proliferation of epithelial cells of parietal layer of Bowman's capsule forming the epithelial crescent along with infiltration of mononuclear cells. H & E -400x.

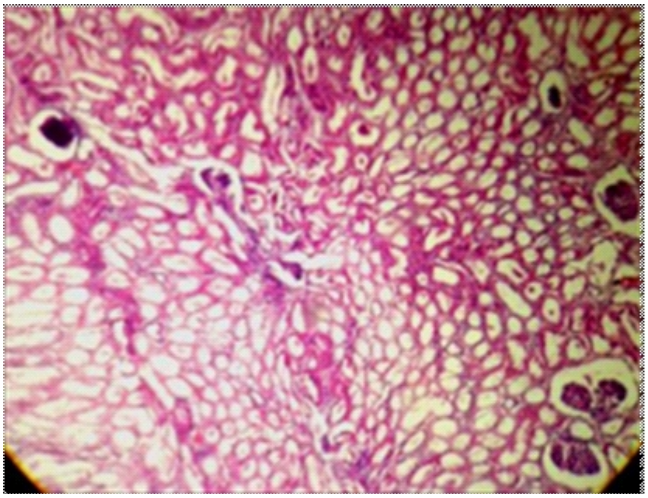

Fig.-3 : Microphotograph of kidney showing chronic glomerulonephritis, atrophy of glomeruli with infiltration of lymphocytes and tubules showing renal cast. H & E -200x.

Acknowledgement

We acknowledge the support and facilities provided by my major advisor, my advisory committee members and teaching faculty of the Department of Veterinary Pathology and Dean, (CVAS, Bikaner) for providing necessary facilities and guidance to investigate this research work. Meanwhile, organised and unorganised pig farms of Bikaner, Jaipur and Alwar districts of Rajasthan.

References

1. Smitha S. (2003). Pathology of gastro-intestinal disorders in piglets. *M.V.Sc. Thesis, Kerala Agricultural University*, Thrissur, 46.
2. Aigner B., Renner S., Kessler B., Klymiuk N., Kurome M. and Wunsch A. (2010). Transgenic pigs as models for translational biomedical research. J*ournal of Molecular Medicine,* 88(7): 653-664.
3. Singhal S.S., Ruchi M., Sunita P., Saini B.S., Mamta S., Ashish J. (2019). Variations inervthrocvtic antioxidants in indigenous pig from arid tracts during hot and cold ambiences. *Veterinary Practitioner,* 20(1): 18-20.
4. Roesel K., Dohoo I., Baumann M., Dione M., Grace D. and Clausen P.H. (2017). Prevalence and risk factors for gastrointestinal parasites in small-scale pig enterprises in Central and Eastern Uganda. *Parasitology Research*, 116(1): 335-345.
5. Lillie R.D. (1965). Histo-pathological technique and practical histochemistry. *Mc-Graw Hill Book Co.* New York and London.
6. Luna G. (1960). Manual of Histological Staining of the Armed Forces Institute of Pathology. (3rd Edn.) *New York: McGraw Hill Book Co.*, 32-40.
7. Bancroft J.D., Suvarna S.K. and Layton C. (2013). Bancroft's Theory and Practice of Histological Techniques (7th Edn.), *British, Churchill Livingstone Elsevier Ltd.*
8. Bourgault A. and Drolet R. (1995). Spontaneous glomerulonephritis in swine. *Journal of Veterinary Diagnostic Investigation,* 7(1): 122-126.
9. Hervas J., Gomez-Villamandos J.C., Mendez A., Carrasco L., Perez J. and Wilkinson P.J. (1996). Structural and ultrastructural study of glomerular changes in African swine fever. *Journal of Comparative Pathology.* 115(1): 61-75.
10. Gurjar T. (2018). Occurrence and pathology of various conditions in kidney of sheep (Ovis aries) in southern region of Rajasthan. *M.V.Sc. Thesis, College of Veterinary and Animal Science, Navania, RAJUVAS*, Bikaner.
11. Jubb K.V.F. and Kennedy P.C. (1970). Pathology of domestic animals. 2nd Edn. *Academic Press*, New York and London.
12. Mathur M., Dadhich H. and Sharma G.D. (2004). Histopathological observation of glomerulonephritis in sheep. *Veterinary Practitioner,* 5: 145-146.
13. Sreevidya K. (2017). Pathological studies on spontaneous lesions in slaughtered pigs. *M.V.Sc. Thesis, Sri Venkateshwara Veterinary University*, Tirupati.
14. Yadav H.S., Indu V., Hemant D., Manisha M., Rupali S. and Sharma S.K. (2019). Histopathological studies on glomerulonephritis in buffaloes. *Veterinary Practitioner,* 20(1): 29-30.
15. Shirota K., Nomura Y. and Saito Y. (1984). Spontaneous swine glomerulonephritis in littermates from a leukemic sow. *Veterinary Pathology,* 6(2): 158-163.
16. Rooj S. (1993). Pathological observation on porcine-kidney (*Doctoral dissertation*, Kolkata).
17. Blome S., Gabriel C. and Beer M. (2013). Pathogenesis of African swine fever in domestic pigs and European wild boar. *Virus Research,* 173(1): 122-130.
18. Meena S. (2019). Occurrence and pathology of respiratory system in pig (Sus scrofa domesticus). *M.V.Sc. Thesis, College of Veterinary and Animal Science, RAJUVAS,* Bikaner.