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Pathological observations on pigs with porcine dermatitis and nephropathy syndrome in Croatia

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ABSTRACT

This paper describes porcine dermatitis and nephropathy syndrome (PDNS) involving fattening pigs in Croatia. In presented cases the typical signs of the syndrome, such as skin haemorrhagic focal necroses, fibrinous glomerulonephritis, lymphocytic depletion and histiocytic infiltration of the lymph nodes and spleen are described. Multinucleated syncytial cells were also found in all immunocompetent organs, including intestinal lymphocytic aggregates.

Key words: pig, porcine dermatitis and neprophaty syndrome (PDNS), pathological changes

Introduction

Although dermal and kidney lesions are common findings in pigs (JONES et al., 1997; CONFER and PANCIERA, 2001; HARGIS and GINN, 2001), and Porcine glomerulonephritides of various etiology and histological types,

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which includes exudative, mesangioproliferative, immune-mediated membranoproliferative and thrombotic subtypes, are also well documented (BJOTVEDT and BERTKE, 1982; SHIROTA et al., 1984; SHIROTA et al., 1986; JANSEN, 1993; JANSEN and NORDSTOGA, 1994; BOURGAULT and DROLET, 1995), the first finding of the syndrome that simultaneously include skin and kidney lesions was reported in Scotland, in January, by SMITH et al. (1993). Their report was confirmed the following month by WHITE and HIGGINS (1993). The authors named the disease "porcine dermatitis and nephropathy syndrome" (PDNS). The condition affected pigs of various ages, i.e. from five-week-old weaners to a nine-month-old gilt, but the majority of cases were recorded in 20 to 65 kg fattening pigs. Animals had focal haemorrhagic skin lesions over the sides of the body and lower limbs in particular. At post-mortem examination the authors recorded dermal and subcutaneous haemorrhages and oedema, swelling of the peripheral lymph nodes and kidney enlargement with surface petechiation. Pathohistologically, acute haemorrhagic epidermitis with necrotising vasculitis and focal epidermal necrosis was found. Kidney lesions were characterised by acute glomerulonephritis with protein leakage into Bowman's capsules, and hyaline casts in the tubules. Subchronic cases showed renal fibrosis with glomerular scarring, and tubular atrophy with scarring and inflammatory cell infiltration. Porcine dermatitis and nephropathy syndrome was subsequently noted in Canada (HËLIE et al., 1995) and Spain (SIERRA et al., 1997; SEGALËS et al., 1998). Very recent data concur that PDNS is caused by Porcine circovirus type 2 (PCV-2) which is also causing a relatively new disease condition known as post weaning multisystemic wasting syndrome (PMWS) (ROSELL et al., 2000; ALLAN et al., 2000; SAOULIDIS et al., 2002; MOLNAR et al., 2002; CHOI et al., 2002; SCHMOLL et al., 2003).

The aim of this paper is to present data concerning the first detected appearance of porcine dermatitis and nephropathy syndrome in Croatia documented by histopathological findings.

Materials and methods

Case 1. In September, 2002 a twelve-week-old fattening female pig weighing 30 kg, from a small pig breeding unit, was sectioned at our Department. Clinical history included anorexia, fever and pallor. A post-

mortem examination was performed and tissue samples (skin, heart, liver, spleen, lymph nodes and kidney) for histopathological examination were taken, fixed in 10% buffered formalin, embedded in paraffin, sectioned in 5 μm-thick sections and stained using the HE method. Samples of liver and spleen were taken for bacteriological investigation, and samples of spleen and pancreas was taken for virological examination concerning hog cholera.

Case 2. During December, 2002 a three-months-old fattening pig weighing 35 kg and with a history of disease of two weeks duration was sectioned at the Križevci Veterinary Institute. The pig originated from a farm comprising 2500 sows. Altogether, 4.7% of post-weaning piglets died in 2000. However, in May and June 2001 the morbidity and mortality rates affecting the pigs rose to 26.0% and 28.8%, respectively. Mortality rates in March and April 2002 were 20.7 and 24.9%, respectively. Mortality then returned to previous levels (4-5%). There were no apparent reproductive problems in the breeding herds in the farm between January, 2000 and December, 2002. Sows on the farm were vaccinated against classic swine fever, Aujeszky's disease and erysipelas. In 2000, boars from The Netherlands, Germany and Austria were introduced into the farm.

The presented animal died displaying clinical signs of necrotic, focal dermatitis, fever and anorexia. After the post-mortem examination, tissue samples were taken in the same manner as in case 1. Bacteriological examination of the lungs, kidney, spleen and small intestine was performed.

Results

Case 1. The gross lesions were fairly distinctive. Skin macular haemorrhages were noted on margins of ears and ventral areas of the neck, thorax and abdomen. Disseminated subendocardial ecchymotic haemorrhages and hydropericardium, lung congestion and oedema, ascites, cortical ecchymoses and disseminated pale areas in the kidneys, haemorrhagic lymphadenitis (Fig. 1) were found, as well as spleen reticular hyperplasia, mild catarrhal enteritis, and liver congestion. The most significant changes histopathologically were seen in the kidneys, lymph nodes and spleen. A severe, diffuse, global fibrinous glomerulonephritis

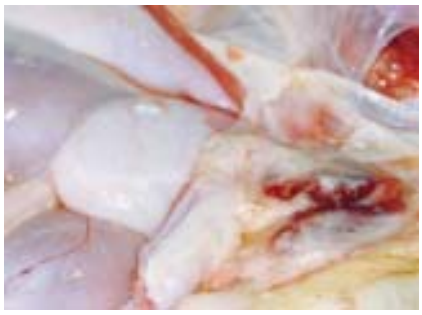

Fig. 1. Swelling and haemorrhages in the supramammary lymph node.

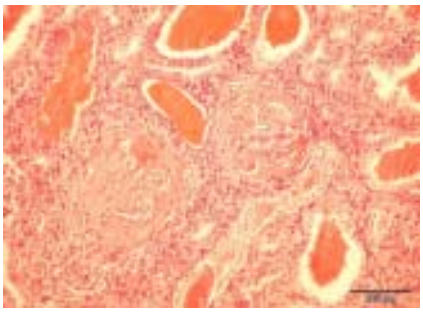

Fig. 2. Fibrinous glomerulonephritis and hyaline casts in the kidney tubules. H&E, scale bar = 200 µm

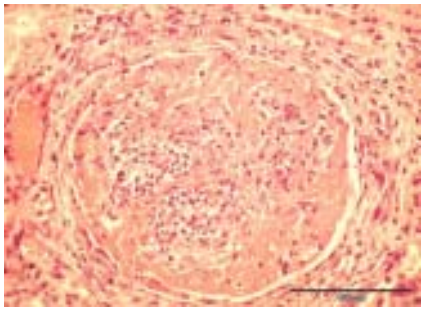

Fig. 3. Fibrinous glomerulonephritis with extracapillary neutrophilic exudation. H&E, scale bar = 100 µm

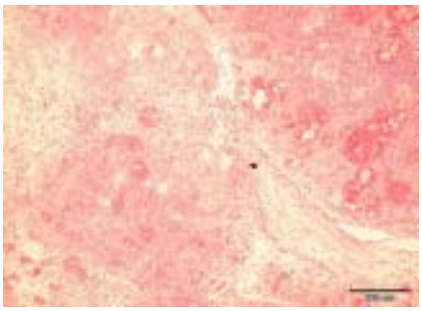

Fig. 4. Haemorrhagic and necrotic exudative lymphadenitis of the supramammary lymph node. H&E, scale bar = 200 µm

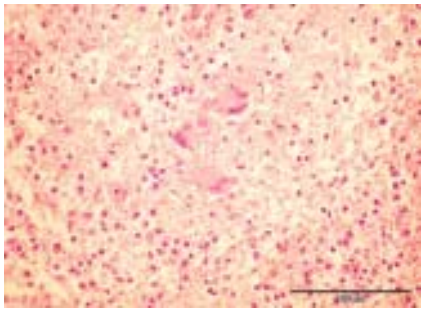

Fig. 5. Severe lymph node histiocytosis and syncytial cell formation (centre of the figure). H&E, scale bar = 100 µm

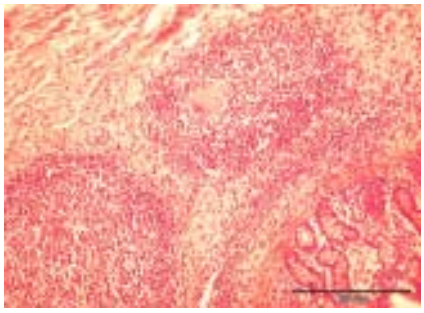

Fig. 6. Follicular intestinal hyperplasia with syncytial cell in the small intestine. H&E, scale bar = 200 µm.

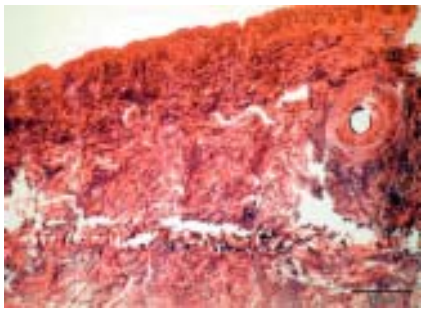

Fig. 7. Skin haemorrhagic necrosis with thrombotic vasculitis. H&E, scale bar = 200 μm

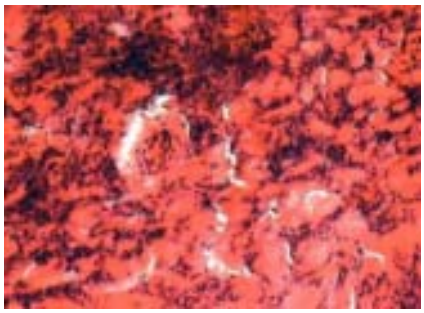

Fig. 7a. Detail of Fig. 7. with thrombosised blood vessel

with infiltration of the neutrophilic leukocytes involving practically all kidney corpuscles was noted. Glomerular sclerosis was also seen in some areas, and renal tubules were distended with hyaline casts (Figs 2 and 3). Some lymph nodes (like supramammary) were severely affected with necrotic-haemorrhagic inflammation (Fig. 4), while in others, lymphocytic depletion and histiocytic infiltration with multinucleated (syncytial cells) formation was found (Fig. 5) The same finding was seen in spleen. In the duodenum, severe lymphofollicular hyperplasia with syncytial cells formation was noted (Fig. 6). Liver was congested and epidermal haemorrhagic focal necrosis with thrombotic vasculitis was seen in the skin (Figs 7 and 7a). The heart was affected with waxy degeneration and disseminated parenchymatous haemorrhages. Bacteriologically, bacteria *Sarcina sp*. and *Corynebacterium sp*. were isolated from spleen sample. Virological examination was negative.

Case 2. Very similar findings were seen as in the previous case with skin haemorrhages (Fig. 8), kidney swelling with disseminated pale areas (Fig. 9) and haemorrhagic lymphadenitis of the mesenterial lymph nodes (Fig. 10). Histopathological examination revealed basically the same changes as in Case 1, including lymphocytic depletion and syncytial cells formation in the spleen and lymph nodes, and fibrinous glomerulonephritis. Bacteriologically, lungs, kidney and spleen were negative and from small intestine bacterium *Escherichia coli* was isolated.

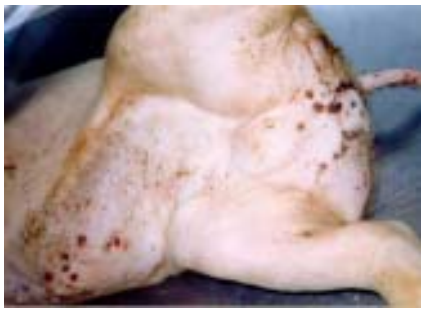

Fig. 8. Disseminated skin focal haemorrhagic necrosis

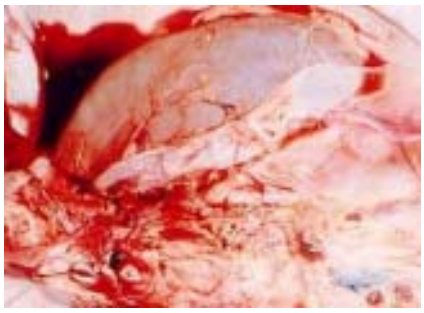

Fig. 9. Disseminated, pale, spotted areas in the kidneys.

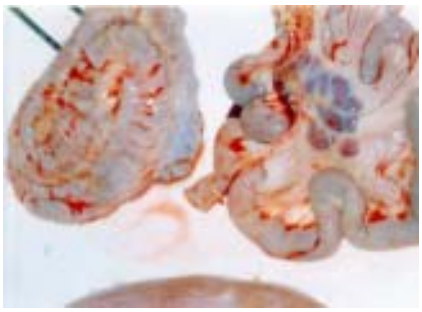

Fig. 10. Severe oedema of the mesocolon and congestion of the mesenterial lymph nodes

Discussion

Histopathologically, porcine dermatitis and nephropathy syndrome is an exudative intra- and extra-capillary glomerulonephritis associated with deposits of immune complexes. Immunohistochemically these deposits stain positively for complement fragments such as C_3 and C_{1q} and immunoglobulins IgM, IgA and IgG (SIERRA et al., 1997). On that basis it can be concluded that pathogenetically PDNS is a type-III hypersensitivity reaction manifested as systemic vasculitis and fibrinous glomerulonephritis. All recent literature data emphasise that PCV-2 is found in all cases of this disease (MOLNAR et al., 2002; CHOI et al., 2002; SCHMOLL et al., 2003). On the other hand, PCV-2 is also considered to be a cause of a PMWS, the syndrome first described in Canada (CLARK, 1997). Subsequently, this disease was described all over the world and PCV-2 is considered to be the main cause of the syndrome (ALLAN et al., 1999; QUINTANA et al., 2001).

Our findings are in complete agreement with previous literature data concerning PDNS. Findings of skin haemorrhagic necrosis, fibrinous glomerulonephritis and syncytial cells in the immunocompetent organs could be considered pathognomonic for this syndrome. However, the finding of syncytial cells in the intestinal submucosal lymphocytic aggregates is, according to our knowledge, the first such description. Finally, it can be concluded that it is probable that both syndromes (PMWS and PDNS) are present in Croatia, very possibly on the farm mentioned in Case 2, which should receive special attention and be monitored by veterinary specialists.

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GRABAREVIĆ, Ž., J. MADIĆ, B. BAČANEK, A. GUDAN, B. ARTUKOVIĆ, O. SMOLEC, A. BECK: Patološke promjene u svinja sa sindromom dermatitisa i nefropatije u Hrvatskoj. Vet. arhiv 74, 3-11, 2004.

SAŽETAK

U radu je opisana pojava sindroma dermatitisa i nefropatije svinja u Hrvatskoj. U promatranju bolesti u tovljenika opisane su karakteristične promjene tj. hemoragične žarišne nekroze kože, fibrinozni glomerulonefritis te deplecija limfocita i histiocitoza limfnih čvorova i slezene. U svim imunokompetentnim organima uključujući crijevne solitarne limfocitne agregate uočene su divovske sincicijske stanice.

Ključne riječi: svinja, sindrom dermatitisa i nefropatije, patološke promjene