Clinical and Histopathological Findings in Pustular Psoriaform Dermatitis (Pityriasis Rosea) in Pigs

Tohru KIMURA¹⁾ and Kunio DOI²⁾

¹⁾Research Department, Saitama Daiichi Pharmaceutical Co., Ltd., 8-1 Minamisakae-cho, Kasukabe, Saitama, 344-0057 and

²⁾Department of Veterinary Pathology, Graduate School of Agricultural and Life Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo, Tokyo, 113-8657 Japan

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ABSTRACT. Three cases of pustular psoriaform dermatitis (pityriasis rosea) in pigs were clinically and histopathologically examined. Grossly, the affected skin was characterized by multiple, circumscribed lesions. Three pigs were the descendants derived from the same Landrace boar. Skin lesions expanded centrifugally to become ring-shaped plaques. There were no abnormal values in hematological and serum biochemical profiles. Histopathologically, the epidermis showed remarkable thickening. The dermal lesions were characterized by a prominent component of superficial and deep perivascular infiltration of eosinophils. Dilatation of microvasculature was accompanied with congested vessels. These results revealed that the etiology of pustular psoriaform dermatitis in pigs was associated with a hereditary predisposition derived from the specific boars. This dermatosis is histopathologically characterized by micro circulatory disturbances with infiltration of abundant eosinophils.

KEY WORDS: eosinophil, microcirculatory disturbance, pustular psoriaform dermatitis (pityriasis rosea).

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Pustular psoriaform dermatitis (pityriasis rosea) in pigs is macroscopically a similar dermatosis to ringworm. The cause of this disease remains undetermined. There is a continuing controversy as to whether so-called “pityriasis rosea in pigs” is identical with human pityriasis rosea [5, 10].

We have encountered three cases of pustular psoriaform dermatitis like disease in our research center. There has been a sparsity of reports concerning clinical and histopathological findings of this swine disease [3, 4, 7, 9, 12]. It is the purpose of this study to present data that may aid in determining its etiology, pathogenesis and pathophysiology. We performed hematological and serum biochemical examinations in three swine cases. In addition, we investigated the histopathological characteristics of the skin lesions.

Three female nine-week-old SPF Landrace pigs developed cutaneous lesions which were characterized by annular and polycyclic papules and linear plaques on the ventrolateral abdomen. These animals were the descendants derived from the same Landrace boar.

Blood samples were collected from the jugular vein of each pig using no anticoagulant. For hematological samples, blood was collected into tubes containing K₂EDTA. At 20 min after collection of blood samples, sera were separated by centrifugation at 1,500 g for 10 min for biochemical analysis.

The following parameters were examined using manual techniques (The Unopet Systems, Becton Dickinson Rutherford, NJ): red blood cell count (RBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and white cell count (WBC). Hemoglobin concentration (Hb) was measured using a blood chemistry analyzer (Dry Chem: Fuji Film Co., Ltd., Tokyo, Japan). Packed cell volume (PCV) was determined with a microhematocrit (KUBOTA

3110: Kubota Co., Ltd., Tokyo, Japan).

The following parameters were measured using a blood chemistry analyzer (Dry Chem: Fuji Film Co., Ltd., Tokyo, Japan): total protein (TP), albumin (Alb), albumin : globulin (A/G) ratio, blood urea nitrogen (BUN), aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP).

In addition, serum proteins were separated by electrophoresis on cellulose acetate, quantified densitometrically and expressed as 6 fractions—albumin (Alb), α_1 -, α_2 -, β - and γ -globulin—using a Rapid Electrophoresis System (Helena Laboratories Co., Ltd., Urawa, Japan).

Tissue specimens were obtained from 2 portions of the skin over the dorsum of each pig using a 6-mm biopsy punch (Nagatoishi Co., Ltd., Japan) and local anesthesia with 2% lidocaine was applied in an annulus surrounding the 6-mm biopsy punch site. The skin specimens were fixed in neutral buffered 10% formalin, and 4- μ m paraffin sections were stained with hematoxylin and eosin (H & E).

Skin scrapings were taken from each pig with pustular psoriaform dermatitis. The skin scrapings were heated in 10% sodium hydroxide to remove epithelial debris and a wet mount was microscopically examined. Other scrapings seeded onto Sabouraud's agar and incubated for 3 weeks. Bacterial and fungal cultures failed to show any pathogenic organisms.

The cutaneous lesions began as small papules with a brownish scab, with a predilection for the abdomen, groin and inner aspects of the thighs. After a month's progress, the groins, flanks, elbows, thighs and belly (especially from the diaphragm backward) were almost completely involved (Fig. 1). The lesions were circular in shape and they varied in size, ranging from 1 cm in diameter to large areas that seemed to be formed by coalescence of two or more these

Fig. 1. Gross appearance. Pustular psoriaform dermatitis in pigs. Multiple, circumscribed, cutaneous lesions with raised hyperemic edges. Case NO. 1.

Fig. 2. Ventral abdomen of the affected pig. The coalescing larger rings covered with crusty bran-like scales. Case NO. 3.

primary sites. Then, these pigs had multiple, circumscribed, cutaneous lesions with raised hyperemic edges on the ventral abdomen and inner thigh. The skin lesions expanded centrifugally to become ring-shaped and scaly plaques, developing whitish centers with a raised erythematous border. The large lesions were covered with crusty bran-like scales (Fig. 2). The skin lesions were not pruritic and

Table 1. Hematological results

Parameter (units)	NO. 1	NO. 2	NO. 3	Reference values (mean $\pm$ SD)
RBC ($\times 10^{12}/l$)	7.46	6.56	8.41	6.86 ± 0.25
Hb (g/dl)	12.6	10.9	14.4	12.2 ± 1.1
PCV ratio	0.42	0.35	0.46	0.38 ± 0.03
MCV (fl)	56.0	54.0	54.0	56.3 ± 2.1
MCH (pg)	16.9	16.6	17.1	17.9 ± 1.1
MCHC (g/dl)	30.1	31.1	31.6	31.8 ± 0.7
WBC ($\times 10^9/l$)	24.6	16.9	17.6	16.4 ± 3.4

Reference values are mean $\pm$ SD from age-matched pigs in our Research Center.

Table 2. Serum biochemical results

Parameter (units)	NO. 1	NO. 2	NO. 3	Reference values (mean $\pm$ SD)
BUN (mmol/l)	5.71	9.28	7.35	5.20 ± 1.25
Glu (mmol/l)	6.25	5.71	5.16	4.60 ± 0.66
T-Chol (mmol/l)	2.56	2.02	2.48	2.29 ± 0.29
AST (IU/l)	22.56	42.24	7.68	80.48 ± 54.10
ALT (IU/l)	17.28	35.04	5.28	37.64 ± 19.53
ALP (IU/l)	19.90	15.07	29.82	35.78 ± 31.25
LDH (IU/l)	446	613	321	323 ± 262
γ -GT (IU/l)	11.0	10.0	18.0	11.0 ± 2.0
CPK (IU/l)	211	315	152	1143 ± 1023

Reference values are mean $\pm$ SD from age-matched pigs in our Research Center.

became to be resolved spontaneously in three weeks.

Hematological and serum biochemical profiles are shown in Tables 1 and 2. There were no abnormal values in hematological and serum biochemical profiles. Serum protein fractions are shown in Table 3. Serum protein electrophoresis revealed a moderate decrease in albumin and slight increases in α_1 -, α_2 -, β - and γ -globulin.

Histopathological findings in the skin of three pigs are summarized in Table 4. The lesions were characterized by a prominent component of superficial and deep perivascular infiltration of eosinophils, with confluent zones of epidermal liquefactive necrosis.

The lesions revealed parakeratosis, thickening, and hyperplasia of the keratinocytes. In some portions, there was marked incrustation over the necrolytic epidermis. Additionally, the epidermal projections were well developed (Fig. 3).

In the dermis, there was a moderately dense superficial and deep perivascular infiltration of eosinophils, lymphocytes and histiocytes. Hemorrhage and dermal edematous

Table 3. Serum protein fractions (g/l)

Patients	TP	Alb	α_1	α_2	β	γ	A/G ratio
NO. 1	55.0	23.0	1.2	17.6	8.2	5.0	0.71
NO. 2	76.0	33.7	0.8	21.4	12.1	8.1	0.79
NO. 3	65.0	26.8	0.5	12.9	15.3	9.6	0.69
Reference values (mean $\pm$ SD)	54.5 ± 1.2	33.2 ± 0.4	0.5 ± 0.03	9.7 ± 0.05	7.5 ± 0.5	3.5 ± 0.2	1.55 ± 0.13

Reference values are mean $\pm$ SD from age-matched pigs in our Research Center.

Table 4. Histopathological changes of the lesions of pityriasis rosea in swine

Changes	Pityriasis rosea	Normal skin
<i>Epidermis</i>		
Parakeratosis	+ to ++	—
Crust	++ to +++	—
Thickening	+++	—
Epidermal hyperplasia	+++	—
Epidermal ingrowths	++	—
<i>Dermis</i>		
Vasodilatation	++	—
Congestion	+ to ++	—
Hemorrhage	±	—
Edema	±	—
Superficial and deep perivascular infiltration	+++	—
Inflammatory cell infiltration	+++	—
Eosinophils	+++	—
Lymphocytes	+	—
Histiocytes	±	—
Endothelial swelling	+ to ++	—

The degree of histopathological changes: — = negative; ± = slight; + = mild; ++ = moderate; +++ = marked.

Fig. 3. Microscopic finding. Marked epidermal hyperplasia with incrustation. Well-developed epidermal elongations are noted. H & E stain. $\times 100$. Case NO. 1.

changes were also slightly observed. Dilatation of microvasculature was accompanied with the congested vessels which were lined by the swollen endothelial cells (Fig. 4). The dermis showed extensive inflammatory cell infiltration of abundant eosinophils, with a small number of lymphocytes.

The cause of pityriasis rosea in pigs is still unknown although there is a strong evidence of familial susceptibility,

Fig. 4. Microscopic finding. Extensive inflammatory cell infiltration of abundant eosinophils. Dilatation and congestion of microvasculature lined by swollen endothelial cells are seen. H & E stain. $\times 200$. Case NO. 2.

either through inheritance or by vertical transmission of an infectious agent [7, 9]. The present cases suggest that pustular psoriaform dermatitis in pigs may have some association with hereditary predisposing factors derived from boars. Detailed investigation will be required to elucidate the etiology of pustular psoriaform dermatitis in pigs.

There were no apparent changes in hematological and

serum biochemical results of three pigs. The slight changes in serum protein fractions of the pigs accorded with the electrophoretic pattern in inflammatory skin diseases, such as exudative skin disease, chronic dermatitis, atopy, cutaneous burns, systemic pyoderma and dermatophytosis, accompanied by a constant discharge from the affected skin surface [11].

Both clinical and gross findings observed in these cases were in close agreement with those of a previous report [8]. Skin lesions progressed rapidly and expanded centrifugally to become annular, linear and/or polycyclic papules. Then, the lesions ran a course of about 3–5 weeks, eventually resulting in resolution spontaneously and completely. Leman *et al.* [7] reported that it was rare for secondary infection to occur and usually uncomplicated cases resolved without treatment in about 4 weeks. This clinical course seemed to be characteristic of pustular psoriaform dermatitis. The course of this dermatopathy in pigs was far different from that of pityriasis rosea in human beings.

The histopathological examination revealed that the skin lesions in the present cases were different from those observed in pigs affected with swine erysipelas and porcine dermatitis and nephropathy syndrome (PDNS). The skin lesions of erysipelas include marked dermal vascular dilatation, and engorgement in the acute phase, neutrophilic vasculitis (arteritis), and suppurative hidradenitis in the subacute and chronic phases. Besides, scattered but extensive dermal hemorrhage and intravascular fibrin coagulation are prominently observed [1, 10]. The skin affected with PDNS shows acute hemorrhagic dermatitis associated with fibrinoid vasculitis [2]. We could not observe these histological changes in the skin of the three pigs. Major clinical differential diagnoses included PDNS and swine erysipelas. The pigs affected with PDNS become anorexic and lethargic and show a rapid loss of condition prior to death [6]. The main clinical findings in pigs affected with swine erysipelas were as follows: fever (40.5–41.8°C), prostration, inappetence, dog-sitting posture and pinkish to dark purple diamond-shaped papule [10, 14]. Above-mentioned findings were not observed in the swine cases.

The epidermal features such as thickening and stout rete ridges seemed to resemble psoriasiform hyperplasia. In the dermis, the injury of the blood vessels with infiltration of abundant eosinophils was definitely observed. Pityriasis rosea in humans, there is a lymphocytic perivascular infiltration with nonconfluent epidermal necrosis [13]. These findings suggested that disturbances of the circulation of microvasculature could be attributable to pityriasis rosea in

pigs.

Extensive inflammatory cell infiltration of numerous eosinophils seemed to be associated with hypersensitivity reactions to inhalants, dietary constituents or environmental factors. As Dunstan and Rossner [5] pointed out, this dermatopathy in pigs is both clinically and histopathologically distinct from human pityriasis rosea which is identified to occur following viral infection. This finding suggests that underlying allergic hypersensitivity should play some etiologic roles in pustular psoriaform dermatitis in pigs.

In conclusion, the etiology of pustular psoriaform dermatitis in pigs may have some association with a hereditary predisposition derived from the specific boars. In addition, this dermatosis is histopathologically characterized by microcirculatory disturbances with infiltration of abundant eosinophils.

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