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The radiographic diagnosis of osteochondrosis in pigs: A retrospective study

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Summary

Objective: To evaluate the use of radiography as a means to diagnose osteochondrosis in pigs.

Method: This retrospective study included 51 cases of osteochondrosis in pigs ranging in age from 2–12 months. The cases were diagnosed in our clinic during a 3-year period. The pigs were examined clinically, then one side of the pigs was radiographed (because osteochondrosis is assumed to be a generalized condition). Radiographs were made for the coxofemoral joints (24), femorotibila joints (24), tarsi (16), humeroradioulnar joints (20), and distal physis of the ulna and carpi (37).

Results: Two categories of radiographic changes were recognized: 1) those affecting the articular epiphyseal cartilage complex; and 2) those affecting the physeal growth plates of the long bones. The frequency of osteochondrotic lesions at the distal physeal plate of the ulna was 32 of 37 (86.4%) of the distal ulna examined. The changes at the distal physeal plate of ulna were graded on a scale from 0–5 according to the size, location, and extent of the lesions, as previously reported. Examples of lesions encountered in different locations were illustrated.

Implications: Radiography is a useful tool for diagnosing osteochondrosis in pigs. The distal physeal plate of the ulna is a suitable site to be radiographed to establish the diagnosis of this generalized condition.

Keywords: swine, osteochondrosis, radiography

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Osteochondrosis is a generalized condition affecting many species of growing animals.[1] Its pathology has been described as a primary disturbed endochondral ossification with secondary bone involvement.[2]

The causes of osteochondrosis are poorly defined, partly because it is difficult to reach a definitive clinical diagnosis in affected pigs, and because there is frequently a lack of seemingly relevant pathological changes at necropsy examination in mild cases. The clinical syndrome has been called "leg weakness," and varies in severity from locomotor abnormality that results from conformation and leg defects to more severe lameness and, in extreme cases, an inability to rise and paresis.[3–5]

Defective endochondral ossification in the growth cartilage of growing pigs has been found to occur at the following predilection sites: the articular cartilage of the medial condyle of the humerus or femur, and the physeal growth plates of the distal ulna, the femoral head, and vertebrae.[6–9] Numerous studies have described macroscopic and microscopic lesions of osteochondrosis in slaughter age pigs.[6,8,10–12]

Radiography is one of the most useful tools available for clinically evaluating the osseous system. Few reports are available, however, on radiological diagnosis and description of osteochondrotic lesions in pigs.[10,13–15]

The purpose of the present investigation was to determine if osteochondrosis could be diagnosed as a clinical problem using radiography in pigs.

Materials and methods

The case material for the study came from the Department of Pig Diseases, University of Bern, during a 3-year period (1993–1995). The study group initially included 60 pigs presented to the clinic with locomotor disorders. Pigs subsequently determined to have infectious joint disease were excluded from the study.

The 51 pigs with osteochondrosis reported in this study ranged in age from 2–12 months (Table 1). Most were large white barrows and other fattening pigs 3–6 months of age, but some were young breeding gilts. The diagnosis of these cases was based largely on the radiographic examination.

Clinical examinations of all pigs were performed and information about the type of lameness and presence or absence of joint swelling was collected. For radiography, general anesthesia was induced using 10 mg per kg thiopentone sodium 10% solution followed by 0.5 mg per kg azaperone (Stresnil®) in the ear vein. Ketamine (Narketan®) was used intramuscularly at a dose of 5–10 mg per kg bodyweight to maintain the anesthesia. The following areas were radiographed:

- pelvis,
- femorotibial joints,
- femoropatellar joints,

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Table 1

Age, sex, and breed of pigs examined

Distribution by age	n
< 3 months	10
3–6 months	32
6–12 months	9
Distribution by sex	
Female	23
Male, castrated	20
Male, intact	8
Distribution by breed	
Large white	42
Landrace	2
Mixed	6

- tarsi,
- humeroradioulnar joints,
- distal physis of the ulna, and
- carpi

(Table 2).

One side of the pigs was radiographically examined because it is supposed to be a generalized condition.[1] The pelvis was radiographed in a ventrodorsal plane to demonstrate both the coxofemoral joints. Other regions were radiographed in a mediolateral and craniocaudal planes. A Siemens Polydoros radiographic machine was used at 50 kV, 16 mAs and focal-film distance (FFD) of 100 cm. The radiographic plates were processed with digital radiographic processing (Fuji AC1). Fuji image plates ST III (24 × 30 cm) were used and finally recorded on Fuji CR 633A.

The radiographic changes at the distal physeal plate of the ulnas were scored as previously reported[16] where 0 is normal and 5 is the most severe form (Table 3).

Results

Clinical findings

The clinical signs were mostly attributed to hind limb disorder. Mild cases showed stiffness in both fore- and hindlimb, (especially immediately after a period of lying down), slowness to rise, walking on tiptoes with short steps (frequently with marked inwardly curving motion during forward progression and lateral swaying of the pelvis). Slight knuckling at the carpi was noticed but joint swelling was not recorded even in severely affected pigs. More severely affected pigs sat on their hindquarters and showed marked reluctance to rise. Epiphysiolysis of the femoral neck in young boars caused sudden hind limb lameness and pain at the hip. The affected leg appeared shorter than the unaffected one.

Table 2

Prevalence of radiographic changes noted in different regions examined in 51 pigs

Region	n	Radiographic changes
Pelvis	24	3 (12.5%)
Tarsus	24	—
Stifle	16	1 (6.25%)
Elbow	20	2 (10%)
Distal ulna	37	32 (86.4%)

Table 3

Radiographic grades 0 (normal) to 5 (severest form) used for the distal physeal plate of the ulna in pigs

Grade	Shape of the physeal plate
0	Straight bone, slender mataphysis, smooth zone of ossification
1	Slightly curved bone, widened metaphysis, smooth zone of ossification
2	Moderately curved bone, widened mataphysis with lipping, and small foci of irregular ossification
3	Markedly curved bone, very wide metaphysis with so-called "pagoda" signs, and large areas of irregular ossification
4	Markedly curved and shortened bone, widened and deformed mataphysis with very irregular ossification in the whole growth zone
5	Markedly curved and shortened bone, widened and deformed mataphysis, very irregular ossification with signs of epiphyseal slipping

Source: Reiland[16]

Radiographic findings

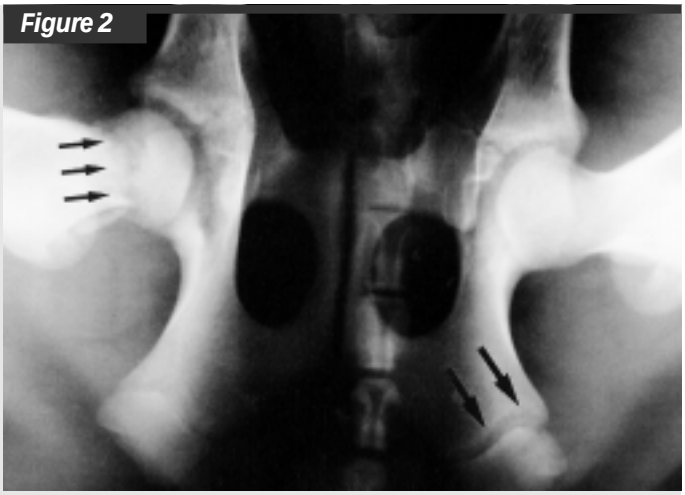
Lesions in the coxofemoral joints included epiphysiolysis of the proximal femoral physeal plate (Figure 1). In one case, apophysiolysis of one ischial tuberosity was noted and epiphysiolysis of the contralateral proximal femoral physeal plate (Figure 2). In another case, radiography revealed a subchondral lesion on the medial condyle of the femur (Figure 3). The tarsi were radiographically normal. In two elbow joints, evidence of osteochondrosis was seen as alteration of the contour of the margin of subchondral bone of the condyles and irregularity of the distal physeal plate of the humerus (Figure 4).

Radiographic changes at the distal ulnar physeal plates were in the form of irregularities of the physis with circular, semicircular, or cone-shaped areas deeper in the metaphysis (Figure 5). Osteochondrotic lesions of the distal physeal plate of the ulna were noticed in 86.4% of the ulnar region examined. Grade two was reported in almost half of the cases (Figure 6).

Figure 1

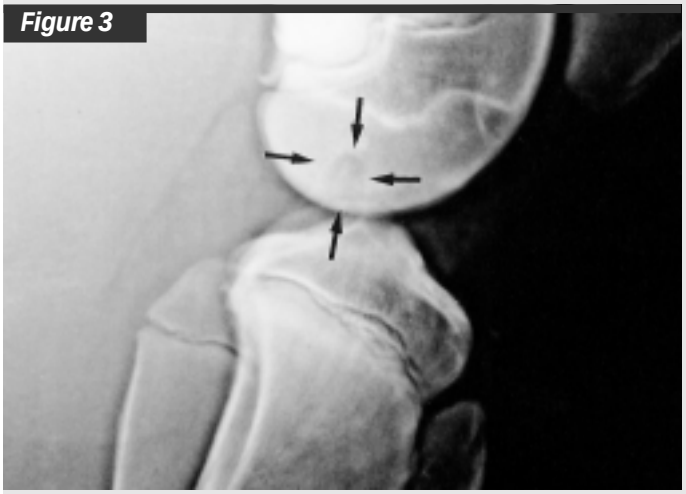
Epiphysiolis with separation of the femoral head along the proximal growth plate of the femur (arrow) in 1-year-old boar.

Figure 2



Apophysiolysis with separation of the ischial tuberosity along the growth plate (double arrow) in a 1-year-old boar. Note the epiphysiolysis of the femoral neck of the contralateral side (small arrows).

Figure 3



Radiolucency in the medial condyle of the femur in the mediolateral view. A solitary, clearly-defined diffuse radiolucency surrounded by a thin sclerotic zone (arrows). The corresponding subchondral margin is not disrupted; consequently there is no radiographic evidence of a direct communication between the lesion and the joint cavity.

Figure 4

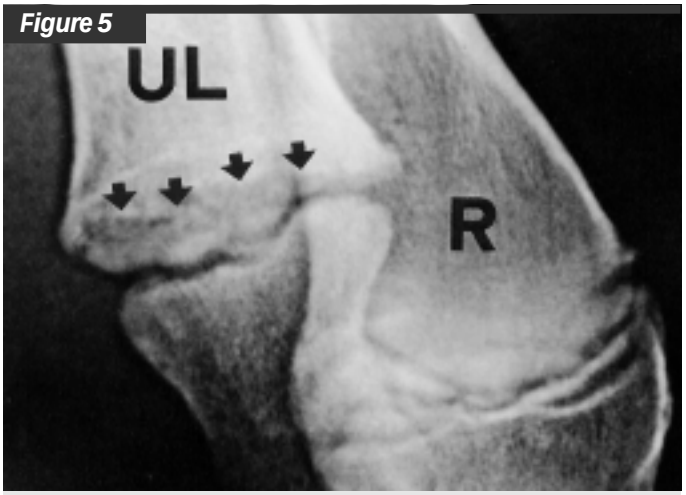
Irregularity of the distal physeal plate of the humerus (arrows) with patchy radiolucency in the subchondral bone.

Discussion

Osteochondrosis is a disease of growing animals characterized by abnormal cartilage development and disturbance of endochondral ossification. The condition affects both articular cartilage (articular epiphyseal complex) and the physeal growth plates. In pigs, osteochondrosis can cause a diagnostic dilemma because clinical signs may be misleading, particularly in mild cases.[3–5] A positive clinical diagnosis of pig osteochondrosis was facilitated by radiographic examination in this study. Alterations in articular surfaces were recorded in the form of subchondral radiolucencies and irregularities of the subchondral bone margin. Since articular cartilage is not demonstrated on a noncontrast radiograph, only the changes in the underlying subchondral bone can be identified with plain radiographs. For this reason, radiographic changes will only be observed in more severe or chronic cases that involve the subchondral bone.

Physeal growth plate lesions were compatible with a previous report.[10] Retained cartilage in the growth plate is believed to create a weakness that ultimately allows separation at those sites. If extensive involvement

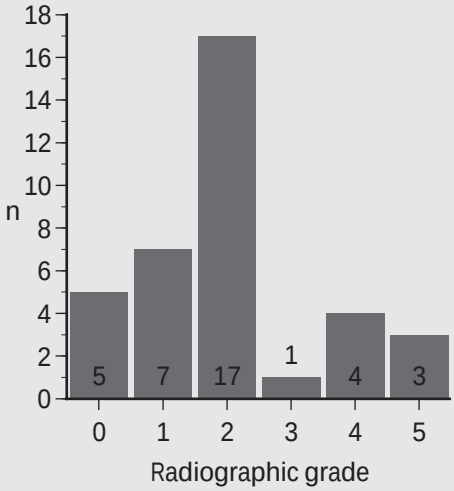
Figure 5



Widened and deformed physeal plate with very irregular ossification (arrows) in the whole growth zone of the distal part of the ulna.

UL ulna
R radius

Figure 6



Prevalence of different grades of osteochondrotic changes in distal physeal growth plate of the ulna

is present along the entire growth plate, one possible outcome is separation of the epiphysis from the shaft, i.e., epiphysiolysis. Although trauma during fighting, sexual foreplay, or copulation may be sufficient in itself to cause epiphysiolysis, weakness along the growth plate by osteochondrosis should always be considered as an underlying cause. The best example is epiphysiolysis of the femoral head along the proximal femoral growth plate.[6,17] In the present study, there was a high predilection for osteochondrotic radiographic changes in the distal physeal plate of the ulna, in agreement with previously published pathological reports.[6,8,18–20]

It is probable that changes affecting articular cartilages only, in the early stages of the disease, would be missed by a radiographic study. Therefore, it is important to remember that a negative radiographic finding does not rule out the possibility of an early osteochondrosis problem. However, radiographic examination of the physeal growth plates of the ulna can be used with greater confidence. It appears that the radiological examination of the distal physeal plate of the ulna would be a prime site for the radiographic diagnosis of osteochondrosis in pigs. Further study, including pathological confirmation of the lesions as osteochondrosis, would be beneficial to the interpretation of the radiographic lesions.

Implications

- Osteochondrosis in pigs creates a diagnostic dilemma, which radiography can resolve.
- The distal physeal plate of the ulna is a suitable site to be radiographed and to reach a presumptive diagnosis of osteochondrosis.

Acknowledgments

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Practice tip

Porcine circovirus diagnostics available

There is a great deal of interest in porcine circovirus diagnostics. FYI, the Infectious Disease Laboratory, Department of Microbiology & Parasitology Laboratory, College of Veterinary Medicine, University of Georgia, is offering a nucleic acid (in situ) hybridization test for porcine circovirus. Should you be interested in further information on proper tissue accession and cost, contact the Laboratory at 706–542–5812 (phone) or 706-542–5233 (fax).