Summary: A putative PCV3-associated disease in piglets from Southern Brazil

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Key Points

- Piglets presenting with large caudally rotated ears, weakness, and dyspnea were assessed.
- The main microscopy finding was multisystemic vasculitis and viral replication was confirmed in these lesions through in situ hybridization.
- Seventeen cases were PCR positive for PCV3 and phylogenetic analysis classified five PCV3 sequences in the PCV3a clade.

Background:

Porcine circovirus 3 (PCV3) was first detected in pigs in the USA in 2015, and is potentially associated with clinical disease such as intestinal, respiratory and reproductive signs. It was first detected in Brazil in 2017 in sow herds presenting with a high prevalence of stillbirths and mummified fetuses. Here, the authors describe PCV3-associated clinical disease with systemic vasculitis, interstitial pneumonia, and ear malformation.

Materials and Methods:

In 2020, the Pathology Laboratory of Universidade Federal do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil, was contacted to investigate a clinical disease that was mainly affecting newborn piglets. Gross evaluation of all piglets was performed and fragments of the main organs (CNS, lung, heart, liver, kidney, spleen, gastrointestinal tract, lymph nodes, bladder, and skeletal muscle) were submitted for histologic evaluation. Tissue specimens from seven cases with marked lesions were selected and submitted to *in situ* hybridization (ISH) assay. Tissue homogenates from the liver, lung, heart, spleen/lymph node, and kidney of each piglet were further analyzed by PCR for porcine circovirus (PCV1, PCV2, and PCV3), porcine parvovirus (PPV1, 2, 5, and 6), atypical porcine pestivirus (APPV), and porcine reproductive and respiratory syndrome (PRRSV) in all the cases. Ovine herpesvirus-2 (OvHV-2) was tested in 9 selected cases. ORF2 region from one positive sample per farm was amplified. The five sequences obtained were aligned with PVC sequences publicly available in GenBank.

Results:

A total of 48 piglets from 16 different sows and five different farms from the largest pig producer state in Brazil (Santa Catarina) were submitted. The farm managers have reported the birth of piglets with large and caudally rotated ears ("Dumbo-like piglets", Figure 1) on an average of 4.8 pigs per litter, weakness, and in most cases, dyspnea. Most piglets died 1–5 days after birth. At post-mortem examination, the lungs did not collapse due to marked interlobular edema. Microscopically, the main feature was multisystemic vasculitis characterized by lymphocytes and plasma cells infiltrating and disrupting the wall of vessels, lymphohistiocytic interstitial pneumonia, myocarditis, and encephalitis.

A total of 17 out of 48 samples tested positive for PCV3. Only case 24 was positive for PCV3 but did not present microscopic lesions. All samples tested negative for PCV1; PCV2; PPV 1, 2, 5, and 6; APPV; PRRSV; and OvHV-2. PCV3 capsid gene alignment showed high nucleotide identity between all the sequences analyzed (97–99%). The sequences from this study shared more than 99% identity among them.

Discussion:

The diagnosis of PCV3-associated clinical disease in neonatal piglets was based on the molecular findings in association with the detection of PCV3 mRNA in microscopic lesions. PCV3 genetic material was detected through PCR in healthy piglet tissues in other studies, and was also evidenced here in the case that was positive for PCV3, but did not present microscopic lesions. Interstitial lymphohistiocytic pneumonia was a constant pathological finding in the analyzed piglets, and through ISH it was possible to show the viral replication. This lesion is not commonly described in cases of PCV3 infection, particularly in perinatal piglets. Interstitial pneumonia is a common finding in viral infections of the inferior respiratory tract. However, other viral pneumonia agents were ruled out by PCR. One of the clinical signs that caught the attention of the producers was large caudally rotated ears in the affected pigs. This finding may resemble piglets born of large litters, with intrauterine growth retardation. However, in our cases, the litters were in all sizes (small, medium, and large), and among the piglets from the same litter, size and weight were homogenous. The ear malformation was a consistent feature observed in piglets in our study, and some of them were negative in PCV3 PCR results. The authors hypothesized that this finding may be related to the gestation phase when the viremia occurred.

Figure 1. a One-day-old piglets presenting large caudally rotated ears and piglets with normal size and correctly inserted ears. **b** Thirty-five-day-old piglet presenting large caudally rotated ears, and had a marked decrease in growth rate

The full paper can be found at:
https://link.springer.com/article/10.1007%2Fs42770-021-00644-7