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〈Case Report〉

A Case of Porcine Infertility Associated with Oviductal Obstruction

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ABSTRACT

Infertility of the pig is directly affects on economic loss and failure of the embryo transfer. In the present case report, we show one rare case of porcine infertility resulted from oviductal obstruction. A gilt showing normal heat behaviors was selected as a recipient of embryo transfer. During the laparotomy surgery, abnormality of the reproductive tract was founded. Several large sized cyst-like structures were founded on infundibulum and body of uterus. Severe enlargement of oviduct represents that obstruction of the oviduct. Sign of fibrosis on the surface of uterus and other internal organs revealed that the obstruction was come arise from prior peritonitis. Mild neutropenia and elevated number of monocytes, eosinophils and platelets in blood smear represent that the peritonitis might be due to chronic parasitic infection. Ovarian function was seems to be normal due to blood progesterone concentration was higher than basal level. The pig was culled because she cannot be recovered by surgical or hormonal treatment.

(Key words : pig, infertility, oviductal obstruction)

INTRODUCTION

High fertility is one of the biggest issues for pig producers, and any infertility condition is directly affects on economic loss. For that reasons, many studies were performed to maximize productive abilities of the pigs and also various management protocols were developed (Noakes *et al.*, 2001). For successful embryo transfer, factors affecting on infertility is also important. In our case, we used many female pigs as a surrogate for producing transgenic pigs, thus, we already does several studies to select appropriate sows or gilts (Koo *et al.*, 2009a; Koo *et al.*, 2009b). However, occasionally, unexpected abnormal pathologic conditions of the surrogates also exist and disturb successfully development of transferred embryos. Unfortunately, reproductive function of female pigs is difficult to examine clinically in field conditions (Heinonen *et al.*, 1998). Therefore, several studies were performed using female reproductive organs from slaughterhouse to analyze cause of infertilities in pigs (Ehnvall *et al.*, 1981; Einarsson *et al.*, 1974; Tummaruk *et al.*, 2009). In most cases, infertilities were caused by ovarian cyst, inactive ovaries or endometritis (Heinonen *et al.*, 1998; Tummaruk *et al.*, 2009). However, in very rare cases (about 0.2% of infertile females), obstruction of oviduct was also founded (Heinonen *et al.*, 1998) as a cause of pig infertility. In the present report, we describe one case of infertile gilt showing obstruction of oviduct.

CLINICAL CASE

A gilt showing standing estrous was selected as a recipient for embryo transfer. The gilt was anesthetized using our standard protocol (Koo *et al.*, 2009a; Koo *et al.*, 2009b). Briefly, a combination of 1.13 mg/kg ketamine (Yuhan Ketamine®, Yuhan Crop., Korea) and 0.3 mg/kg xylazine (Celactal®, Bayer Animal Health Crop., Korea) was injected through IV for induction and 3% of isoflurane (Ifran®, Hana Parm Co., Ltd., Korea) was used for maintenance. Reproductive organs including uterus and ovaries were exposed by laparotomy. Unexpectedly, several cyst-like structures were founded on infundibulum and body of uterus (Fig. 1a). Severe enlarged oviduct was also founded (Fig. 1b) on one side of reproductive tract represent that obstruction of the oviduct. Severe fibrosis was also

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Fig. 1. Reproductive tract of the case. (a) Overall shape of reproductive tract, (b) Enlarged oviduct, (c) Fibrosis on uterine body.

founded on overall surface of the uterus and other internal organs (Fig. 1c). Due to fibrosis, obstruction site cannot be recovered by surgical treatment. The incision site was ligated without embryo transfer or other treatment and then the pig was culled.

The pig was showing signs of heat four times before the surgery (Table 1). However, the second and the third heats showing irregular duration of cycle (33 and 41 days) compared to normal. After the third heat the duration of cycle became normal.

Blood was collected in the middle of the surgery and analyzed (Table 2). Most of results were in the reference ranges, however, elevation of platelets, monocytes and eosinophils and mild neutropenia were founded (Fig. 2). Level of progesterone was also analyzed and the result indicates that the concentration of progesterone in the blood was 3.73 ng/ml.

DISCUSSION

In the present study, we found a rare oviductal obstruction case in pig. Studies performed with human infertile cases explain the pathogenesis of oviductal obstruction in two causes (Papaioannou, 2004). Because of the oviduct has no sphincter mechanism, most of obstruction cases were come arise from the backflow of uterine contents into oviduct. On the other hand, some cases of obstructions were resulted from peritonitis or endometritis. In case of the present report, we conclude that the obstruction was caused by prior peritonitis because we found several signs of inflammation.

First, severe fibrosis on the surface of uterus and other internal organs strongly represent prior peritonitis condition. We conclude that some part of the oviduct was blocked as a result

Table 1. Records of the date of the pig showing standing estrous

Date of the standing estrous	Estrous cycle length (d)
2010. 6. 12	The first heat
2010. 7. 15	33
2010. 8. 25	41
2010. 9. 18	24
2010. 10. 13	25

Table 2. Blood analysis results

	Reference range[a]	Case
WBC (1/ul)	11,000~22,000	14,630
RBC (10^4/ul)	500~800	700
Hb (g/dl)	7~22	17
PCV (%)	32~50	42.6
MCV (fL)	50~68	60.8
Platelet (10^4/ul)	20~50	94*
Monocyte (10^3/ul)	0~1	1.35*
Lymphocyte (10^3/ul)	3.8~16.5	9.89
Seg. Neutrophil (10^3/ul)	2~15	1.58+
Band Cell (10^3/ul)	0~0.8	0.18
Eosinophil (10^3/ul)	0~1.5	1.64*
Basophil (10^3/ul)	0~0.5	–
Progesterone (ng/ml)	–	3.73

WBC; white blood cell, RBC; red blood cell, Hb; hemoglobin, PCV; packed cell volume, MCV; mean corpsular volume, Seg. neutrophil; segmented neutrophil.

* Higher value than reference range.

+ Lower value than reference range.

[a] References obtained from the previous reports (Amstutz *et al.*, 1998).

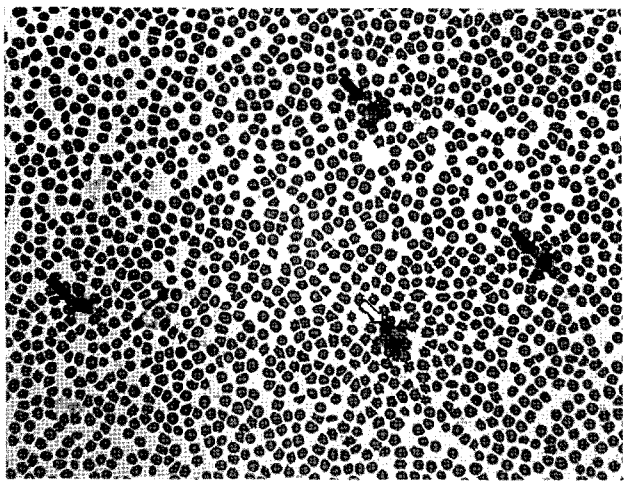

Fig. 2. Photography of blood smear slide. Many lymphocytes (black arrow) rather than neutrophils and mild elevation of eosinophil (white arrow) were founded.

of fibrosis and then accumulated contents of oviduct extend rumen of the canal of oviduct and build cyst-like structures. Also, elevated number of platlets and neutropenia with monocytosis and eosinophilia from blood smear results revealed that the animal might suffer parasitic infection with chronic inflammation recently (Duncan *et al.*, 1994). Therefore, we conclude that the peritonitis might be due to chronic infection of parasite. The previous reports already show that several parasite infection including helminthes result in peritonitis in pigs (Kaufmann, 1996).

However, this type of infertility is hard to diagnose in field condition. As explained before, most of infertility case was resulted from inactive ovaries or ovarian cysts. It is easier to differential diagnose of oviductal obstruction from inactive ovaries. Different from inactive ovaries that never show standing estrous, the gilt of the present report shows typical behavior of heat. Moreover, blood progesterone concentration level was elevated in the present case compared to the basal level reported in several previous reports (Stevenson *et al.*, 1981; Van de Wiel *et al.*, 1981) represent that the ovaries of the pig in the present case is not inactive. On the other hand, the present case is resembles ovarian cyst cases that represented by irregular estrous cycle length (Cho *et al.*, 2010). In the present case, cycle lengths were irregular in the first three heats, though, back to normal after third heat. Inactive ovaries or ovarian cysts can be treated by injection of hCG or GnRH analogs (Cho *et al.*, 2010). However, oviductal obstruction can not be recovered by hormone injection and should be culled for maximizing pig production. Thus, early diagnosis protocol for the oviductal obstruction will be useful if available. In the present case, we found the obstruction during surgery, however, in the field we assume that realtime ultrasonography will be very helpful to diagnosis oviductal obstruction. As shown in the present study, several large cyst-like structures were founded nearby oviduct and body of uterus. Therefore these structures might be easily detectable using ultrasonography. Thus, we strongly recommended to doing ultrasonography if female pigs showing estrous behaviors regularly or irregularly but failed to establish pregnancy.

CONCLUSION

In conclusion, the present report shows rare case of pig infertility caused by oviductal obstruction. The pig shows normal ovarian function, however fail to establish pregnancy. The oviductal obstruction seems to be resulted from prior peritonitis induced by parasitic infection. We recommended culling cycling gilts or sows if they failed to establish pregnancy more than 3 or 4 times trials because they might have oviductal obstruction problem. Ultrasonography diagnosis will be helpful to confirm the cause of their infertility problem.

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