

Segmental Aplasia of the Right Uterine Horn in a Primiparous Holstein Cow

Ill-Hwa Kim¹, Hyun-Gu Kang, Tai-Young Hur*, Hae-Rim Lee and In-Pil Mo

College of Veterinary Medicine, Chungbuk National University, Cheongju 361-763, Korea

*National Institute of Animal Science, RDA, Cheonan 330-801, Korea

(Accepted: October 11, 2012)

Abstract : An infertile, three-year-old primiparous cow was diagnosed preliminarily with pyometra by rectal palpation at 180 days postpartum. Ultrasonography showed that the cranial portion of the right uterine horn was distended with fluid, while the base portion of the horn was missing. A dense band of tissue connected the cranial portion of the uterine horn to the uterine body. However, the left uterine horn was normal. Gross postmortem analysis of the reproductive organs confirmed the ultrasonographic observations. Histopathological observations also showed that dark red-brown mucus filled the thin-walled right uterine horn, where neither caruncles nor uterine glands were observed. Finally, this primiparous Holstein cow was diagnosed with segmental aplasia of the right uterine horn.

Key words : Holstein cow, ultrasonography, uterus, segmental aplasia.

Introduction

Segmental aplasia of the uterus occurs after arrested development of the paramesonephric duct during fetal development (2). This anatomical defect may be attributable to a single, autosomal recessive gene that causes sex-linked sterility (3) and it is known as "White Heifer Disease." The frequency of this congenital anatomical defect was reported as 0.15-0.2% in a slaughterhouse survey (6).

Ovulation may occur on the ipsilateral uterine side in cows with segmental aplasia in the uterine horn, but corpus luteum (CL) regression may fail to occur because the endometrium without glands might not release PGF_{2α}. Thus, the blockage prevents the expulsion of uterine secretions, which may result in its accumulation in the uterine horn and a prolonged anestrus period (5). However, exogenous administration of PGF_{2α} may lyse the CL, followed by the resumption of estrus. In contrast, cows with a unilateral aplasia of the uterine horn may continue to cycle if ovulation can occur in the intact uterine horn because PGF_{2α} may be released from endometrial glands in the intact uterine horn (4), thereby facilitating pregnancy. Nevertheless, cows with a congenital anomalous condition should be culled due to their infertility and the hereditary source of this defect.

This case study reports a segmental aplasia of the right uterine horn in a primiparous Holstein cow that had a history of infertility, which was referred to the Veterinary Medical Center, Chungbuk National University.

Case

An infertile three-year-old primiparous cow was presented to the Veterinary Medical Center, Chungbuk National University at 180 days postpartum. The cow was diagnosed preliminarily with pyometra by rectal palpation, where the right uterine horn was distended with fluid. Following two doses of 25 mg PGF_{2α} (Lutalyse, Pharmacia & Upjohn, Puurs, Belgium) by intramuscular administration at a 14 d interval, the cow experienced three consecutive estruses and respective artificial inseminations (AI) were performed. At 60 d after the final AI, transrectal ultrasonography (Sonoace 600 with 7.5 MHz linear-array transducer; Medison Co Ltd, Seoul, Korea) visualized a CL on the right ovary, a dominant follicle on the left ovary, and a normal left uterine horn (Fig 1A). However, the cranial portion of the right uterine horn was distended with full of fluid, while the base portion of the uterine horn was absent. A dense band structure was detected that connected the cranial portion of the horn to the uterine body, which had a more hyper-echoic structure than the fluid-filled cranial portion (Fig 1B). Based on these ultrasonographic examinations, the cow was diagnosed secondarily with segmental aplasia of the right uterine horn.

The cow was slaughtered six months after the ultrasonographic examinations. Then the reproductive organs were carefully examined in the laboratory. There was a mature CL (26 mm) on the left ovary and a dominant follicle (13 mm) on the right ovary, with normal structure (Fig 2A). The left uterine horn was also normal (Fig 2A). However, the cranial portion of the right uterine horn was distended, containing approximately 600 mL of dark red-brown mucus (Fig 2B). The base portion of the right uterine horn was also absent, and a broad band of tissue connected the cranial portion of

¹Corresponding author.
E-mail : illhwa@cbu.ac.kr

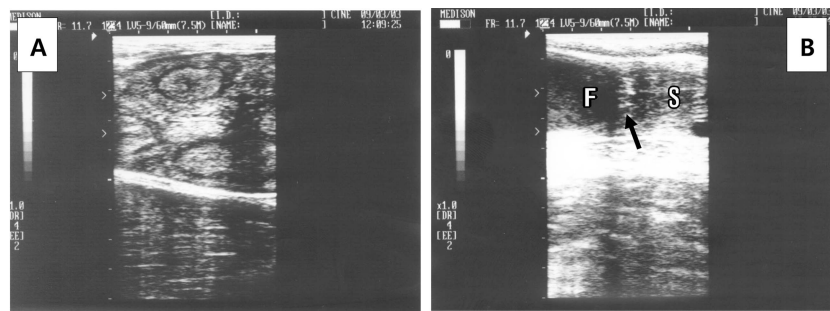


Fig 1. Ultrasonographic observation of the left (A) and right uterine horns (B). (A) Cross-section of the left uterine horn with a normal structure. (B) Longitudinal section of parts of the cranial and anaplastic portions of the right uterine horn. Cranial portion of the right uterine horn distended with anechoic fluid (F). The base portion of the uterine horn was absent (segmental aplasia), while a dense band structure was present (S), which had a more hyper-echoic structure than the cranial portion containing anechoic fluid. The arrow indicates the border between the full-filled cranial portion and the aplastic portion with a dense band structure.



Fig 2. Gross postmortem analysis of reproductive organs collected from the slaughtered cow (A, B and C). (A) A mature CL can be seen on the left ovary and a dominant follicle (DF) in the right ovary. The left uterus had a normal appearance. (B) The cranial portion of the distended right uterine horn contained approximately 600 mL of dark red-brown mucus in the endometrial cavity. The base portion of the right uterine horn was absent, while a broad band of tissue formed the anaplastic portion (arrow), which connected the cranial portion of the uterine horn to the uterine body. (C) Opened section of the left and right uterine horns. Multiple normal caruncles (arrow) were observed on the endometrium of the left uterine horn, whereas no caruncles were observed on the endometrium of the thin-walled, distended right uterine horn.

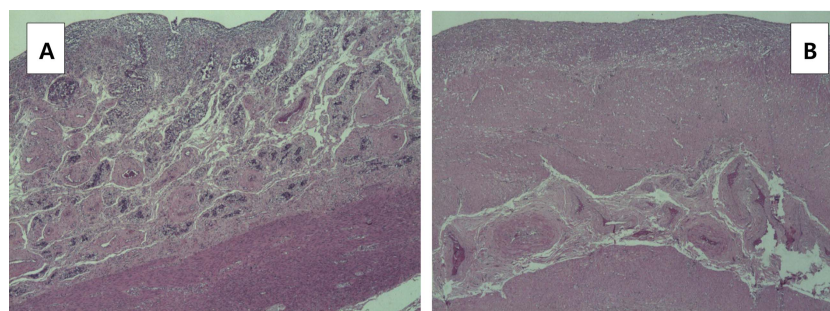


Fig 3. Histopathological analysis of the left (A) and right uterine horns (B). (A) An abundance of uterine glands were distributed in the thick endometrium layer of the left uterine horn. (B) No uterine glands were observed in the thin endometrium layer of the anomalous right uterine horn. A and B: hematoxylin and eosin stain, $\times 40$.

the horn to the uterine body, i.e., the anaplastic segment (Fig 2B). Caruncles were not observed on the opened section of the thin-walled right horn (4.7 mm vs 8.8 mm for left horn), whereas the multiple normal caruncles were observed on the endometrium of the left horn (Fig 2C). Histopathological examinations detected no uterine glands in the thin endometrium layer of the anomalous right uterine horn (Fig 3B), whereas abundant uterine glands were distributed in the thick endometrium layer of the left uterine horn (Fig 3A).

Discussion

In this study, the initial evaluation of the reproductive organs by rectal palpation failed to detect a segmental aplasia of the right uterine horn, leading to a presumptive diagnosis of pyometra with repeated treatments of PGF_{2α}. This treatment failed to eliminate the fluid in the horn because of the blind base portion of the horn. However, an evaluation of the reproductive organs via ultrasonography detected the anatomical defect of the right uterine horn, which was confirmed by the subsequent gross postmortem analysis of the reproductive organs. Thus, a serial examination of the reproductive organs by ultrasonography may help to differentiate a uterine horn distended with fluid due to segmental aplasia from pyometra, mucometra, or other similar uterine pathologies.

A sac-like dilation containing a dark red-brown mucus secretion in the anomalous uterine horn was due to the prolonged retention of uterine secretions, which was similar to that found in a previous study (4). However, the volume of the uterine secretion in the current study was much lower than the 3-4 L detected in the previous study. The difference in the volume of the accumulated uterine secretions may be attributable to the different ages of the cows. Our finding that no caruncles were observed on the thin-walled endometrium layer of the anomalous right uterine horn was not consistent with a previous study, where the authors found that the endometrium of the uterine horn with segmental aplasia was eroded around the base of the caruncles, resulting in pedunculation and thrombosis of the caruncles (4). The histopathological analysis detected no uterine glands in the thin endometrium layer of the anomalous right uterine horn, although an abundance of uterine glands was present in the thick endometrium layer

of the left horn. These findings were not also consistent with another previous study, where they observed the number of endometrial glands was markedly reduced and most of them were compressed in a cat (1). The histopathological findings suggested that the release of luteolysin PGF_{2α} may have been blocked in the anomalous right uterine horn of the cow.

In this report, an infertile primiparous cow received a presumptive diagnosis of pyometra after rectal palpation before a subsequent diagnosis of segmental aplasia of the right uterine horn following ultrasonographic examination, which was confirmed by the gross postmortem analysis. Thus, serial ultrasonographic examinations might be useful for identifying congenital anatomical defects of the reproductive organs, such as segmental aplasia of the uterine horn, which cause infertility in the cow.

Acknowledgments

This work was carried out with the support of the "Cooperative Research Program for Agriculture Science & Technology Development (Project No. PJ008464)" Rural Development Administration, Republic of Korea. This work was also supported by the research grant of Chungbuk National University in 2012.

References

1. Chang J, Jung J, Yoon J, Choi M, Park J, Seo K, Jeong S. Segmental aplasia of the uterine horn with ipsilateral renal agenesis in a cat. *J Vet Med Sci* 2008; 70: 641-643.
2. Ginther OJ. Segmental aplasia of the mullerian ducts (White Heifer Disease) in a White Shorthorn Heifer. *J Am Vet Med Assoc* 1965; 146: 133-137.
3. Gregory PW, Mead SW, Regan WM, Rollins WC. Further studies concerning sex-limited genetic infertility in cattle. *J Dairy Sci* 1951; 34: 1047-1055.
4. Morris LH, Fairles J, Chenier T, Johnson WH. Segmental aplasia of the left paramesonephric duct in the cow. *Can Vet J* 1999; 40: 884-885.
5. Roberts SJ. *Veterinary Obstetrics and Genital Diseases*, 3rd ed. Vermont: Woodstock. 1986: 523.
6. Stettler M, Linnabary RD, Henry RW, Held JP. Segmental aplasia of a uterine horn (uterus unicornis) in a Senopol beef cow. *Bov Pract* 1988; 23: 29-30.

홀스타인 초산우에서 우측 자궁각의 부분무형성 일례

김일화¹ · 강현구 · 허태영* · 이해림 · 모인필

충북대학교 수의과대학, *국립축산과학원

요 약 : 번식장애의 병력을 가진 3세 홀스타인 초산우가 분만 후 180일에 직장검사에 의해 자궁축농증으로 예비 진단되었다. 초음파검사 결과, 우측 자궁각의 전반 부분이 액체로 팽만, 자궁각 기저부 결손과 자궁각의 전반 부분은 치밀한 조직 띠에 의해 자궁체에 연결되어 있음을 보여 주었다. 좌측 자궁각은 정상적인 형태를 나타내었다. 사후 육안 검사는 초음파 검사 소견을 확증시켜 주었다. 벽이 얇아진 우측 자궁강 내에 진한 적갈색 점액이 차여 있었으며, 조직 병리 검사에 의해 이 부위에서 자궁소구 및 자궁샘이 관찰되지 않았다. 본 증례는 최종 우측 자궁각의 부분무형성으로 판명되었다.

주요어 : 홀스타인 경산우, 초음파검사, 자궁, 부분무형성