Therapeutic Effects of Moxibustion on Delayed Uterine Involution in Postpartum Dairy Cows

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ABSTRACT. Moxibustion on 12 specific points (Keiketsu in Japanese) was applied for treatment of delayed uterine involution in 16 cows that were diagnosed on the basis of rectal palpation and vaginoscopic examination 21 to 35 days after parturition. The treatment was continued for three consecutive days. Other 32 cows with the delayed uterine involution were either injected intramuscularly with 25 mg PGF₂α (17 cows) or infused in utero with 500 mg ampicillin (15 cows). The uterine involution following the treatment was monitored by rectal palpation and vaginoscopic examination. Milk samples were collected three times weekly and used for milk progesterone assay to monitor the ovarian function. No significant difference was observed in the uterine involution among the groups treated with moxibustion, PGF₂α or ampicillin. Percentages of cows with abnormal cervical mucus and bacterial isolation from cervical swab decreased remarkably in all groups during 4 weeks after treatment. Forty-six percent of cows with delayed uterine involution was diagnosed as having inactive ovaries. Percentage of cows that responded with ovulation and corpus luteum formation after moxibustion was 67 percent, slightly higher than those in cows treated with PGF₂α or ampicillin. Reproductive performance after the moxibustion was well-comparable to those after PGF₂α or ampicillin treatment. Result indicates that the moxibustion could be used as the alternative to PGF₂α and antibiotics for treating delayed uterine involution in cows.—**KEY WORDS:** cattle, delayed uterine involution, moxibustion, postpartum.

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The ideal calving interval should be 12 months. Delayed uterine involution and re-establishment of ovarian cyclicity after calving are two major factors affecting the calving interval. It is, therefore, imperative to detect cows with delayed uterine involution and to treat them to promote uterine involution.

The delayed uterine involution has often been treated with an intrauterine infusion of antibiotics with indistinct effect [8, 10, 11]. Recently, an intramuscular administration of PGF₂α or its analog has also been used for the treatment of postpartum uterine infection [9, 12]. Besides, therapeutic effect of GnRH on cows with endometritis following retained placenta and delayed resumption of ovarian cycle has been reported [13].

Acupuncture has been used for the treatment of wide variety of infectious, inflammatory, allergic and febrile diseases in human and animals [3, 4]. Moxibustion has also been applied to treat chronic disease [4]. In this method keiketsu (the stimulating points) is heated with burning moxa (dried wild grass *Artemisia vulgaris*) [2, 4]. In cattle acupuncture facilitates uterine contraction and ovarian function [1, 2]. In Japan it has generally been believed by veterinarians that moxibustion is effective to promote uterine involution and to re-establish ovarian

cyclicity in postpartum cows. If this is the fact, the therapy should have some advantage over the administration of antibiotics for cows with delayed uterine involution. The treatment has neither side effect nor drug residue, and is easy to accomplish and economical. However, there have been few reports on the effect of moxibustion in cattle. This paper reports the therapeutic effect of moxibustion on cows with delayed uterine involution.

MATERIALS AND METHODS

One hundred and eighty-five Holstein Friesian cows in commercial dairy farms in Kitami, Hokkaido, were examined per rectum as well as vaginoscopically for uterine involution first at 21–28 days postpartum and again 7 days later. Of 185 cows examined, 48 were diagnosed as showing delay of the postpartum uterine involution, while 137 cows show the normal uterine involution. A larger than normal uterine cervix or gravid horn, 5 cm or larger in diameter or swelling of the uterine wall as well as the presence of pus, mucopurulent cervical mucus, and congestion of the cervix were all considered to be evidence of delayed uterine involution. The cows not showing any evidence of delayed uterine involution either at the first or the second reproductive check were judged to have normal uterine involution. They were, therefore, not treated.

Forty-eight cows with delayed uterine involution were divided into three groups at random. The first group of 16 cows was given moxibustion therapy only, the second group of 17 cows was injected intramuscularly with 25 mg

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Fig. 1. Moxibustion points for the treatment of delayed uterine involution in cows.

PGF₂α-THAM salt (Nihon Upjohn, Tokyo), and the third group of 15 cows was treated with an intrauterine infusion of 500 mg ampicillin dissolved in 100 ml physiological saline solution at the day of second check, 28–35 days postpartum.

The moxa of the size of quail egg was applied to 12 points that would stimulate the uterus and ovaries (Fig. 1). The moxa was burnt for 10 to 15 min. This was repeated daily for 3 days. The uterine involution and re-establishment of ovarian cyclicity following treatment were monitored by rectal palpation, vaginoscopic examination, bacterial examination of the cervical swab and milk progesterone determination for 4 weeks. The diameter of the cervix and both uterine horns were estimated per rectum and the cervical swab was obtained for bacterial isolation. Foremilk samples were collected three times weekly (Monday, Wednesday, Friday) by farmers from the quarters of the udder into a polystyrene tube. After defatting milk samples by centrifugation at 3,500 rpm for 20 min, progesterone concentrations in skim milk were determined by enzyme immunoassay (EIA) [6, 7].

Reproductive performance was compared among the three groups of cows with delayed uterine involution. The comparison was also made among the 48 cows with delayed uterine involution and 137 cows with normal uterine involution.

RESULTS

Average age, lactation number, and condition at calving in cows treated are shown in Table 1. There were no statistically significant differences among the three groups. The cows with delayed uterine involution that were given the moxibustion therapy, as well as those treated with antibiotics and PGF₂α, showed rapid decrease in the cervical diameter (Fig. 2). The differences in the sizes between the gravid and non-gravid uterine horns also decreased markedly (Fig. 3).

The percentage of cows with endometritis diagnosed by abnormality in the cervical mucus decreased gradually following the treatments with moxibustion (Fig. 4). There were tendencies that the group showed a little slower decreases in both the percentages of cows with abnormal

Table 1. Average age and lactation number of treated groups of cows

	Average age	Lactation number	Condition at calving	
			RP ^{a)}	DY ^{b)}
Moxibustion	4.6±1.8 ^{c)}	2.9±1.7	1	2
PGF ₂ α	4.9±1.9	3.6±1.9	2	0
Ampicillin	4.6±2.6	3.3±2.4	2	0

a) Retained placenta.

b) Dystocia.

c) Mean±SD

Fig. 2. The changes in sizes of the cervix after treatment in cows with delayed uterine involution.

cervical mucus and the incidence of bacterial isolation from cervical swab (Figs. 3, 4, 5).

Milk progesterone profiles before and after treatment were classified into three types (Fig. 6) [5]. Cows of type 1 had inactive ovaries before treatment and responded with ovulation and corpus luteum formation to treatment (n=11, 22.9%). Cows of type 2 had inactive ovaries and did not respond to treatment (n=11, 22.9%). Cows of type 3 had already corpus luteum before treatment and continued to show the normal ovarian function after treatment (n=26, 54.2%). The percentages of cows responding to treatment in cows having inactive ovaries were 66.7% (4/6) after moxibustion therapy, 45.5% (5/11) after PGF₂α injection, and 40.0% (2/5) after ampicillin infusion in utero. It was likely that moxibustion therapy

Fig. 3. Changes in the difference between sizes of the gravid and non-gravid horns after treatment in cows with delayed uterine involution.

Fig. 4. Changes in the incidence of abnormal cervical mucus after treatment in cows with delayed uterine involution.

Fig. 5. Changes in the percent of bacterial isolation from cervical swab after treatment in cows with delayed uterine involution.

was more effective in cows with inactive ovaries associated with delayed uterine involution compared with PGF_{2α} or antibiotics' therapy, although the differences were not

Fig. 6. Typical patterns of changes in milk progesterone levels in cows with delayed uterine involution after treatment with moxibustion, PGF_{2α}, or ampicillin. Type 1 cows responded with ovulation within 2 weeks after treatment; Type 2 cows not responded to treatment; and Type 3 cows with ovarian cyclicity before treatment.

Table 2. Effect of treatments on ovarian quiescence in cows with delayed uterine involution as shown by milk progesterone levels

Treatment	No. of cows with ovarian quiescence	Positive response	Effective rate(%)
Moxibustion	6	4	66.7
PGF _{2α}	11	5	45.5
Ampicillin	5	2	40.0
Total	22	11	50.0

statistically significant (Table 2). No distinct relationship was observed between the percentage of bacterial isolation from cervical mucus and ovarian function monitored by milk progesterone analysis before and after treatment.

Reproductive performance of cows with delayed uterine involution is presented according to the methods of treatment given. The reproductive performance of cows with delayed uterine involution treated with either moxibustion or PGF_{2α} was well compared with that of cows with normal uterine involution (Table 3). The moxibustion treated group showed the highest first insemination conception rate and shortest interval from parturition to conception among the three groups. The ampicillin treated group showed unsatisfactory reproductive per-

Table 3. Reproductive performance of cows with delayed uterine involution treated by different methods

Treatment	No. of cows			Days ^{a)} from calving to		First AI conception rate (%)
	treated	inseminated	culled	AI	conception	
Cows with delayed uterine involution						
Moxibustion	16	15	1	85±39	113±51	60.0 ^{b)}
PGF _{2α}	17	17	2	79±28	116±77	47.1 ^{b)}
Ampicillin	15	15	0	72±19	129±54	13.3 ^{c)}
(Total)	48	47	3	79±30	120±62	40.4
Cows with normal uterine involution (not treated)						
	137	137	0	83±23	115±44	46.7

a) Mean±SD.

b), c) Significantly different (p<0.05).

formance in terms of first insemination conception rate significantly lower than the two other groups (p<0.05), and calving to conception interval.

DISCUSSION

The delayed uterine involution, either associated with endometritis or not, could successfully be treated by an intramuscular injection of PGF_{2α}. PGF_{2α} may stimulate uterine contraction and may also facilitate a uterine defense mechanism [9]. However, PGF_{2α} may not show a direct effect on ovarian dysfunction unless the cows have the functional corpus luteum.

The moxibustion on the specified 12 points is considered to stimulate both uterine contraction and ovarian function [2]. It has also been demonstrated that moxibustion increases antibody, stimulates phagocytosis and leukocytosis, and thus makes the uterine defense mechanism active [4]. If this is also the case in cattle, moxibustion will be more practical for the treatment of delayed uterine involution than treatments with PGF_{2α} or antibiotics. The treatment is easy to accomplish, economical and free from any drug residue in the milk.

Results of the present field experiments confirmed the earlier statement by some authors that an intrauterine administration of antibiotics was not as effective as generally expected and PGF_{2α} could be an alternative to antibiotics' therapy [8]. Causes of extraordinary low first insemination conception rate shown in cows after an intrauterine infusion of ampicillin in this experiment, was not known. A relatively shorter interval from calving to first insemination in this group of cows compared with the other two groups (72±19 vs. 85±39 and 79±28), might presumably has attributed to the low conception rate.

It is indicated in this study that moxibustion could be as effective as PGF_{2α} administration in treating the delayed uterine involution. The authors, therefore, recommend moxibustion therapy as one of safe, economical and effective methods of treatment for delayed postpartum uterine involution in dairy cows.

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