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The Change of Frequency of Gastric Contraction with Oculo-aupuncture in Dogs

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Abstract : This study was performed to clarify the effect of oculo-acupuncture(OA) on change of gastric contraction. Twenty-four clinically healthy mongrel dogs were used and divided into two groups regarding feeding condition; non-acupoint group (n=6) and Stomach/Spleen region group (n=6) were stimulated by OA. In addition, 12 dogs were fasted for 24 hrs and divided into two groups; non-acupoint group (n=6) and Stomach/Speen region group (n=6) was stimulated by OA. The change in frequency of gastric contraction was measured via abdominal ultrasound before, 0, 30, 60 and 120 minutes after OA. Significant differences were detected at 30 mins ($p<0.05$), 60 mins ($p<0.05$) and 120 mins ($p<0.01$) in the Stomach/Speen region group, compared with those of non-acupoint group in feeding condition.

Key words **:** Oculo-acupuncture, gastric contraction, Stomach/spleen region.

Introduction

Acupuncture(AP) is a kind of treatment method used to control energies from the organs by stimulation of the acupoints based on body meridians and Yin-Yang theories. It is known that AP includes needle-AP, aqua-AP, laser-AP, auriculo-AP and electro-AP etc. (18).

Oculo-acupuncture(OA) is a novel form of needle-AP used to treat diseases by applying AP at acupoints around the eyeball and on orbital edge. It has been previously described in human clinical practice and employed in China (20). As mentioned in a classical ancient medical book in China, the eyes are closely related to the internal organs and meridians and the AP applied at the acupoints around eye can be used to treat many diseases of the whole body (20). Therefore OP has known positive therapeutic effects in human diseases including vomiting, acute muscular sprain, apoplexy and hemiplegia (20).

The major function of the stomach is mixing and storage of the ingested food, and controlled release into the duodenum (13). Antral contractions serve to retropel the contents and to thereby mix the ingesta and delay the passage of solid particles at a frequency of five cycles per minute in the dog (5).

In previous reports about gastric motility by AP, Sato *et al.* (17) reported that AP inhibited gastric motility and/or reduced gastrospasm, while Lin *et al.* (11) reported that shallow needling promoted intestinal peristaltic function and Kim *et al.* (8) reported that AP at BL21 significantly increased gastric motility. However, studies reported up to now mainly used body acupoints. In veterinary clinical study by OA, Lee *et al.* (10) reported that OA at stomach/spleen region had significantly decreased serum gastrin levels in dogs.

Therefore this study was designed and performed in order to investigate the effect of OA on the changes of frequency of gastric contraction between non-feeding and feeding groups in dogs.

Materials and Methods

Experimental animals design

A total of 24 clinically healthy mongrel dogs(1~4 years old and 3~15 kg) were used in this study. The experimental dogs were fed with commercial diet (PETIA Co., Korea) twice daily (each 400 g) and allowed water *ad libitum*. This study was performed two hours after feeding. Dogs were divided into two groups of feeding condition; non-acupoint (n=6) and Stomach/Spleen region groups (n=6) stimulated by OA. Additionally, 12 dogs were fasted for 24 hrs and were divided into two groups of non-feeding condition; non-acupoint (n=6) and Stomach/Spleen region groups (n=6) stimulated by OA. The present study followed protocols approved by the Animal Care Committee of Chungnam National University.

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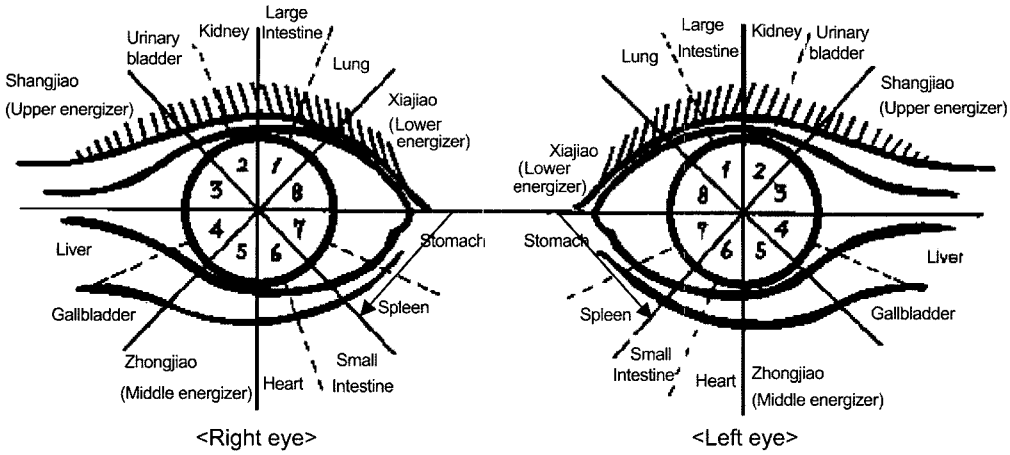

Fig 1. Regions of AP at oculo-acupoints and needle insertion direction (arrow) (20).

OA

Stomach/Spleen region was used in OA of the present study according to the method of human OA (Fig 1). Non-acupoints located about 1 cm above from both orbicularis oculi muscle were used and needle (Hwato®, Suzhao Medical Appliance Factory, China) was horizontally inserted approximately 13 mm to outside directions in non-acupoint group. In the Stomach/Spleen region group, the OA needles were obliquely inserted 13 mm from BL01 to ST01 direction in both eyes. Needling was maintained for 20 minutes in all groups.

Gastric contraction

All dogs were supine positioned and hair was clipped and there were no technical errors by contacting the probe with skin using gel. Ultrasound examinations were performed with a SonoAce 9900 (Medison Co., Korea) with a 7-MHz sector probe. Transverse images (Figs 2 and 3) were obtained by placing the transducer in a transverse plane on the cranial abdomen, parallel to the tight costal arch. The frequency of gastric contraction was defined as the number of contractions per 2 minutes scanning time.

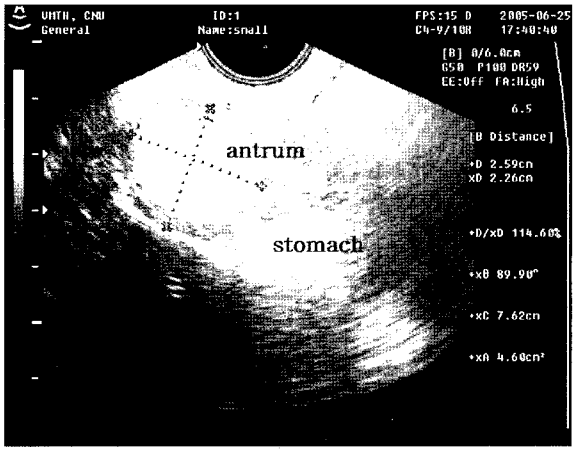

Fig 2. Ultrasonographic image of the pyloric antrum during relaxation in feeding condition.

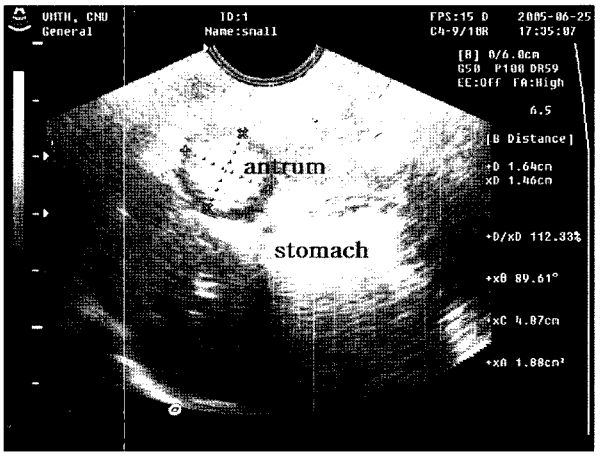

Fig 3. Ultrasonographic image of the pyloric antrum during contraction in feeding condition.

Statistical analysis

Student's *t*-test was used to compare data gathered from the two groups. A value of $p<0.05$ was considered significant. All data was analyzed using Microsoft Excel (Microsoft Corp., USA).

Results

Feeding condition

The frequency of gastric contraction (per 2 min) in feeding condition were 11.2±1.5, 9.8±1.5, 9.8±1.2, 10.2±1.3 and 9.0±1.3 on before, 0, 30, 60 and 120 minutes after OA at non-acupoint group, respectively. There was almost no change in contraction frequency after OA.

The frequency of gastric contraction (per 2 min) in feeding condition were 11.0±1.4, 9.8±1.5, 7.3±1.9, 6.0±2.8 and 5.3±2.2 on before, 0, 30, 60 and 120 minutes after OA at Stomach/Spleen region, respectively.

This group showed a continuously decreasing pattern after OA when compared with that of pre-OA. The significant dif-

ferences among groups were detected at 30 mins($p<0.05$), 60 mins($p<0.05$) and 120 mins($p<0.01$) in Stomach/Spleen region group after OA when compared with to non-acupoint group (Fig 4).

Non-feeding condition

The frequency of gastric contraction (per 2 min) in non-feeding condition were 9.5±1.0, 9.7±1.6, 9.8±1.3, 9.3±1.6 and 9.0±0.9 on before, 0, 30, 60 and 120 minutes after OA for the non-acupoint group, respectively. They showed almost no change in frequency after OA.

The frequency of gastric contraction (per 2 min) in non-feeding condition were 9.7±1.8, 9.2±1.7, 8.8±1.2, 7.8±0.8 and 8.3±1.0 on before, 0, 30, 60 and 120 minutes after OA at the Stomach/Spleen region group, respectively. This group showed a slight decrease in frequency after OA. There was no significant difference between non-acupoint and Stomach/Spleen region groups (Fig 5).

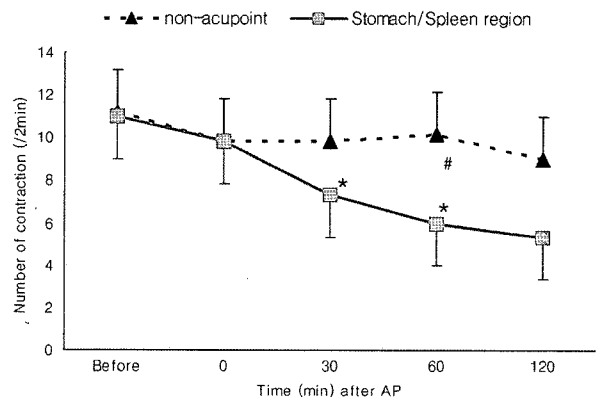

Fig 4. Comparison of the gastric contraction by OA between non-acupoint and Stomach/Spleen region groups in feeding condition. *: Significance between non-acupoint and Stomach/Spleen region groups($p<0.05$). #: Significance between non-acupoint and Stomach/Spleen region groups($p<0.01$).

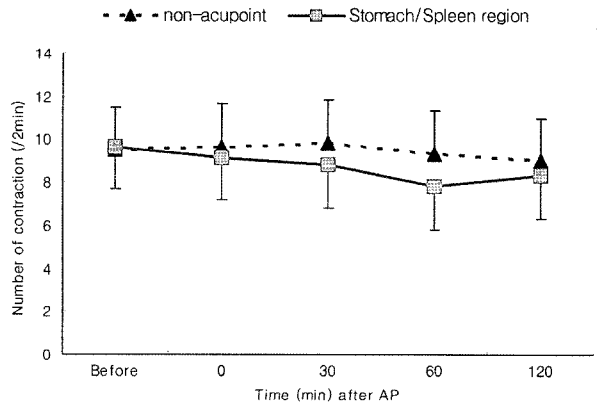

Fig 5. Comparison of the gastric contraction by OA between non-acupoint and Stomach/Spleen region groups in non-feeding condition.

Discussion

The maximum frequency of antral contraction is set by the slow wave, which in the dog and horse occurs at the rate of 4 to 5 cycles per minute (15). Slow waves are initiated somewhere on the greater curvature of the stomach and spread distally with increasing velocity and voltage. In the terminal antrum, the velocity is highest, so that vigorous contractions occur (13). The mechanical response to the gastric contraction is governed by neural and hormonal influences (13). When the stomach is distended with food, mechanical receptors in the wall of the stomach are activated, and vagal tone to the stomach increases (5). The inhibitory control of gastric emptying is brought about by an enterogastric reflex (neural mechanism) and an enterogastrone (endocrine mechanism) (13).

Non-invasive ultrasonography has been shown to be a useful method to evaluate gastroduodenal motility (6). There are reports about functional analysis of gastric emptying with ultrasonography in veterinary medicine (1). The change of frequency of gastric contraction was measured for 2 minutes to easily compare each group, and gastric contraction was found to be 4 to 5 times per minutes in normal dogs (15).

Choi *et al.* (1) and Pennick *et al.* (16) reported that using ultrasound is simple and repeatable, and an accurate method for the functional analysis of the stomach. It could be further applied to may other diseases related to gastric motility. Frequency of gastric contraction was easily measured by ultrasound in the present study as well.

As previously reported, gastric motility with AP, electro-AP at BL21 accelerated gastric emptying time compared to those of CV12 and ST36 (4), and traditional AP at BL21 significantly increased the gastric motility (8,12). In addition, electro-AP stimulation of BL21 and BL25 had an influence on stomach motility (7) and amplitudes of rumen and abomasal motility markedly increased after electro-AP in normal goats (14). Previous studies evaluating gastric motility by AP were mainly by needle-AP and electro-AP until now. The effect of OA on changes in gastric contraction was investigated in this study.

According to classical ancient medical books in China, the eyes are closely related to the internal organs and meridians and the AP applied at the acupoints around eye can be used to treat many diseases of the whole body, therefore after observing the minute changes of blood vessels on conjunctiva of eye, the acupoints around the eyes are selected according to the principle of differential diagnosis and treatment in traditional Chinese medicine. These sites are stimulated to treat various diseases, such as vomiting, acute muscular sprain, apoplexy and hemiplegia, and pain (20). Therefore, the Stomach/Spleen region around the eye was stimulated by OA in this study.

These results showed that the change of gastric contraction in OA group significantly decreased compared with those of control group in feeding condition, and there was no significant change among groups in non-feeding condition. These

results could not be compared directly with other studies about OA because there are no reports about effect on gastric contraction by OA, however, these results were similar to that by needle-AP or laser-AP at ST36 (2), an acupoint of Stomach meridian, and were opposite to that by Lee *et al.* (9) which abomasal motility by needle-AP at BL20, BL21, an acupoint of Urinary Badder meridian, and GV2-1 in Holstein cow was increased at 20 minutes. Although the mechanism of decrease in frequency of gastric contraction could not be clarified in the present study, however, the acupoint at Stomach/Spleen region in the present study might be related BL and ST meridians and is assumed to play a role in decreasing gastric contraction.

AP has been known to a effect on both inhibitory and stimulatory action (18). Gontar (3), Sato *et al.* (17) and Tatewaki *et al.* (19) reported that AP has an effect on the site-specific inhibitory or stimulatory action of gastric motility. Lee *et al.* (10) reported that OA at stomach/spleen region had significantly decreased serum gastrin levels in dogs. Therefore, the decrease in serum gastrin concentration might be caused by inhibition of gastric phase rather than gastrin release controlled in the cephalic phase and intestinal phase during feeding. in addition Choi *et al.* (1) reported that the frequency of pyloric antrum contraction was significantly increased in a soup group than in a saline group, but change in gastric contraction by OA in the present study was decreased in spite of all dogs being fed 2 hrs prior to evaluation and frequency of gastric contraction was decreased to a larger degree after OA at Stomach/Spleen region compared with OA at non-acupoint in feeding condition group. It was proposed that OA in feeding condition affected gastrointestinal hormonal activity. No change in the frequency of gastric contraction by OA at Stomach/Spleen region was observed in non-feeding condition.

Therefore, decrease of the frequency of gastric contraction by OA was assumed to occur by inhibition of enterogastrone (endocrine mechanism) activity (14). Additional studies of OA, including clarification of similaries in animal palpebral acupoints compare to that of humans, and the therapeutic effect by OA using various animal patients with diseases including vomiting, diarrhea, gastritis and nausea, etc should be performed in the future.

References

1. Choi MC, Seo MH, Jung JH, Lee KC, Yoon JH, Chang DW, Park RD. Evaluation of canine gastric motility with ultrasonography. J Vet Med Sci 2002; 64: 17-21.
2. Diehl DL. Acupuncture for gastrointestinal and hepatobiliary disorders. J Altern Complement Med 1999; 5: 27-45.
3. Gontar AA. Correction of the gastric and duodenal motility by laser puncture in pancreatobiliary diseases. Lik Sprava 2002; 1: 126-129.
4. Jeong SM, Kim HY, Nam TC. Effect of traditional acupuncture on canine gastric motility. J Vet Clin 2002; 19: 397-400.
5. Jones BD. Canine and feline gastroenterology. 1st ed., Saunders 1986; 104-108.
6. Kametani H, Sato A, Sato Y, Simpson A. Neural mechanisms of reflex facilitation and inhibition of gastric motility to stimulation of various skin areas in rats. J Physiol 1979; 294: 407-418.
7. Kim BS, Choi HI. The effects of electroacupuncture on stomach and cecum motility in horses. Kor J Vet Res 1998; 38: 183-199.
8. Kim HY, Kwon OK, Nam TC. Effect of BL-21 (Wei-Yu) acupoint stimulation on gastric motility following preanesthetic treatment in dogs. J Vet Sci 2000; 1: 133-138.
9. Lee JM, Nam TC, Chang KH. Effect of traditional acupuncture on abomasal motility in holstein cow. Korean J Vet Clin Med 1998; 15: 151-155.
10. Lee SE, Liu Jianzhu, Cho SN, Lee YT, Song KH, Kim DH. The change of serum gastrin concentration with oculoacupuncture in dogs. J Vet Clin 2006; 23(2): 119-122.
11. Lin Y, Zhou Z, Shen W, Shen J, Hu M, Zhang F, Hu P, Xu M, Huang S, Zheng Y. Clinical and experimental studies on shallow needling technique for treating childhood diarrhea. J Tradit Chin Med 1993; 13: 107-114.
12. Lin X, Liang J, Ren J, Mu F, Zhang M, Chen JD. Electrical stimulation of acupuncture points enhances gastric myoelectrical activity in humans, Am J Gastroenterol 1997; 92: 1527-1530.
13. Melvin JS. Dukes' physiology of domestic animals, 10th ed. Cornell university press 1984: 284-285.
14. Nam TC, Cheong CK, Jo CH, Sung JK. Effect of electroacupuncture on motility of the rumen and abomasum of goats. Kor J Vet Res 1987; 27: 127-135.
15. Nyland TG, Mattoon JS. Small animal diagnostic ultrasound, 2nd ed. Saunders 2002: 208-209.
16. Pennick DG, Thomas GN, Paul EF, Larry YK. Ultrasonography of the normal canine gastrointestinal tract. Vet Radiol 1989; 30: 272-276.
17. Sato A, Sato Y, Suzuki A, Uchida S. Neural mechanisms of the reflex inhibition and excitation of gastric motility elicited by acupuncture-like stimulation in anesthetized rats. Neurosci Res 1983; 18: 53-62.
18. Schoen AM. Veterinary acupuncture; ancient art to modern medicine, 1st ed., Mosby. 1994: 5-18.
19. Tatewaki M, Harris M, Uemura K, Ueno T, Hoshino E, Shiotani A, Pappas TN, Takahshi T. Dual effects of acupuncture on gastric motility in conscious rats. Am J Physiol Regul Integr Comp Physiol 2003; 285: 862-872.
20. Zhao X. Eye acupuncture therapy. 1st ed., China: Academy press. 1997: 40-48.

개에 있어서 안침에 따른 위 수축운동 횟수의 변화

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요 약 : 본 연구는 개의 위 수축 횟수의 변화에 미치는 안침의 효과를 규명하기 위하여 수행되었다. 임상적으로 건강한 24두의 잡종 견을 사료 급여군과 사료 비급여군으로 나누었으며, 각각의 군에서 안침군과 대조군으로 구분하여 각각 실시하였다. 위 수축운동 횟수는 초음파로 안침 전, 직후, 30분, 60분 및 120분째에 측정하였다. 실험군(위/비장 영역)에서의 위 수축운동 횟수가 대조군(임의영역)에 비해 감소소견을 나타내었으며, 특히 안침요법 후 30분($p<0.05$), 60분($p<0.05$) 및 120분($p<0.01$)에 각각 유의성 있는 감소소견을 나타내었다. 사료를 미급여한 조건에서, 실험군(위/비장 영역)에서의 위 수축운동 횟수가 대조군(임의영역)에 비해 안침 후 다소 감소하는 소견을 나타내었으나, 군간 유의성은 나타내지 않았다. 이상의 결과를 종합해 볼 때, 사료를 급여한 조건에서 위/비장 영역에 대한 안침이 개의 위 수축운동 횟수를 감소시켰다.

주요어 : 위 수축운동, 안침, 위/비장 영역