

The Efficacy of Needle-Acupuncture at Nei Guan (PC06) and Xin Shu (BL15) on Canine Tachycardia

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Abstract : This study examined the efficacy of needle-acupuncture (AP) at Nei Guan (PC06) and Xin Shu (BL15) on canine tachycardia. A total of 18 beagle dogs were divided into three groups: a control (6 heads), PC06 (6 heads) and BL15 (6 heads) group. Tachycardia was induced by an intramuscular injection of glycopyrrolate. No treatment was given to the control group. Needle-AP at PC06 and BL15 were applied simultaneously at the same time as the glycopyrrolate injection for 20 minutes in PC06 and BL15 groups, respectively. The changes in R-R intervals and respiration rates were determined. The changes in the R-R intervals in the PC06 and BL15 groups were significantly higher than the control group. The R-R intervals of the BL15 group were significantly higher than in the PC06 group. The changes in the respiration rates in the PC06 group were similar to those of the control group. However, the respiration rates in the BL15 group were significantly lower than the control and PC06 groups. In conclusion, needle-AP at PC06 and BL15 is effective in assisting in the recovery from induced canine tachycardia. However, needle-AP at BL15 is more effective than that at PC06.

Key words : PC06, BL15, tachycardia, dog.

Introduction

Arrhythmia is an irregular cardiac rhythm caused by an abnormality of the cardiac electric signal pathway or heart lesion. Arrhythmias are usually classified into bradyarrhythmia and tachyarrhythmia. Bradyarrhythmia includes sinus bradycardia, sino-atrial block, sinus arrest and bradycardia-tachycardia syndrome etc., and tachycardia includes atrial tachycardia, atrial flutter, supraventricular tachycardia, atrial flutter, atrial fibrillation and atrioventricular nodal reentry tachycardia (3,14). Treatment of arrhythmia depends on the severity and the presence of underlying disease. Some are serious and require medication, but others are innocuous and do not require any treatment at all (3,13,14,16,18).

On the other hand, the therapeutic effects of traditional oriental medicine (TOM) on various human and animal diseases have been demonstrated (4,5,6,20). In particular, in cardiovascular diseases, the heart rate, pulse and skin electric conductivity, and tension were decreased by electro-acupuncture (AP) stimulation at Xin Shu (BL15). In addition, electro-AP at Shen Men (HT07) and Zhi Zheng (SI07) improves the cardiac function and activated sympathetic nerve system in acute ischemic injury in rabbits (1,7).

Recently, it was reported that Needle-AP at Nei Guan (PC06) and BL15 are effective in assisting in the recovery from canine induced bradycardia (10). However, the recovery effect on canine tachycardia by TOM has not been investigated. Accordingly, this study examined the recovery effect by needle-AP at PC06 and BL15 on glycopyrrolate-induced canine tachycardia.

Materials and Methods

Experimental animals

A total of 18 beagle dogs (2-3 years old, 7.6-13.7 kg BW, males) were used in this study. The experimental dogs had preliminary feeding for 2 weeks before the experiment. Clinically healthy dogs with heart rates of 100-120/min were used. Dog food (Jerony Friend, CJ Co., Korea) and water were given *ad libitum*. The experimental animals were fasted for 12 hours before the experiment.

The experimental animals were divided into three groups: control (6 dogs), PC06 (6 dogs) and BL15 (6 dogs) groups. Tachycardia was induced by an intramuscular injection of glycopyrrolate (Tabinul, Hana Pharmacological Co., Korea: 0.03 mg/kg).

No treatment was administered to the control group after the glycopyrrolate injection. Needle-AP at PC06 and BL15 for 20 min was performed at the same time as the glycopyrrolate injection in the PC06 and BL15 groups, respectively.

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Acupuncture

Needle-AP was performed using an acupuncture needle (stainless steel, diameter: 0.3 mm, length: 30 mm, Dong Bang Acupuncture, Korea) at PC06 (in the groove caudal to the flexor carpi radialis and cranial to the superficial digital flexor mm., approximately 3 cm proximal to the carpus) and BL15 (at the fifth intercostals space, lateral to the longissimus thoracis m.) for 20 min (15) (Fig 1).

Determination of respiration rates and R-R intervals

The changes in R-R intervals were determined by ECG (Nihon Koden, Japan) before, and 10, 20, 30, 40, 50 and 60 minutes after the glycopyrrolate injection. At the same time, the changes in respiration rates were determined.

Statistical analysis

The significances of the results obtained in this study were

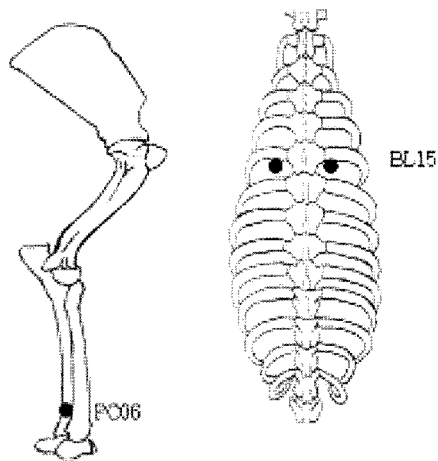


Fig 1. The acupoints used in this study.

analyzed using SPSS 12.0 K, Mann-Whitney U ($p < 0.05$ and $p < 0.01$).

Results

The changes of R-R intervals

The changes in the R-R intervals in the PC06 and BL15 groups were all significantly higher at 10 min ($p < 0.01$), 20 min ($p < 0.01$), 30 min ($p < 0.05$) and 60 min ($p < 0.05$) after the glycopyrrolate injection than the control group, respectively. In addition, the R-R intervals of the BL15 group were significantly higher at 10 min ($p < 0.01$) after the glycopyrrolate injection than the PC06 group (Table 1).

The changes of respiration rates

The changes in respiration rates in the PC06 group were similar to those of the control group. However, those in the BL15 group were significantly lower at 30 min ($p < 0.01$) and 40 min ($p < 0.01$) after the glycopyrrolate injection than the control group. In addition, the respiration rates in the BL15 group were significantly lower at 30 min ($p < 0.05$) and 40 min ($p < 0.05$) after the glycopyrrolate injection than the PC06 group (Table 2).

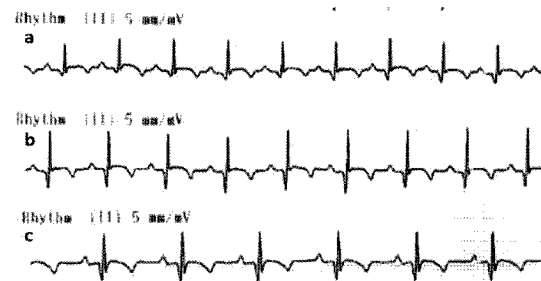


Fig 2. ECG findings at 10 minutes after the glycopyrrolate injection (a: control group, b: P06 group, c: BL15 group, 5 mm/mV).

Table 1. Change in R-R interval after needle-acupuncture at PC06 and BL15

Groups	Time after glycopyrrolate injection (minutes)						
	Pre	10	20	30	40	50	60
Control	0.6 ± 0.02	0.3 ± 0.06	0.3 ± 0.01	0.3 ± 0.02	0.3 ± 0.02	0.3 ± 0.02	0.4 ± 0.02
PC06	0.6 ± 0.03	0.3 ± 0.02 ^a	0.3 ± 0.01 ^a	0.3 ± 0.01 ^b	0.3 ± 0.02	0.4 ± 0.02	0.4 ± 0.02 ^b
BL15	0.6 ± 0.02	0.4 ± 0.02 ^{a,c}	0.3 ± 0.02 ^a	0.3 ± 0.03 ^b	0.3 ± 0.04	0.4 ± 0.03	0.4 ± 0.03 ^b

(Result are shown as the mean ± S.D.(sec.), ^a: Significant difference between the control and experimental groups ($P < 0.01$), ^b: Significant difference between the control and experimental groups ($P < 0.05$), ^c: Significant difference between PC06 and BL15, ($P < 0.01$))

Table 2. Change in respiratory rate after needle-acupuncture at PC06 and BL15

Groups	Time after glycopyrrolate injection (minutes)						
	Pre	10	20	30	40	50	60
Control	20.2 ± 2.56	20.3 ± 3.50	22.2 ± 2.40	21.0 ± 2.68	19.2 ± 2.40	18.3 ± 3.34	17.5 ± 1.22
PC06	17.0 ± 5.25	16.7 ± 5.13	19.5 ± 3.67	19.3 ± 3.08	18.0 ± 1.90	17.5 ± 2.26	16.7 ± 3.44
BL15	20.2 ± 3.71	17.7 ± 1.50	17.8 ± 4.11	15.3 ± 1.97 ^{a,b}	15.0 ± 2.19 ^{a,b}	16.5 ± 1.22	16.2 ± 2.71

(Result are shown as the mean ± S.D.(min.), ^a: Significant difference between the control and experimental groups ($P < 0.01$), ^b: Significant difference between PC06 and BL15, ($P < 0.05$))

Discussion

Canine tachycardia is usually treated by drugs that decrease the heart rate (14). The use of alternative medicine is increasing in accordance with the increased awareness of the side effects of drugs. AP was reported to be an effective alternative medicine for the treatment of circulatory diseases in humans and animals. Jung *et al* (9), reported that non-invasive Dongchuchim at Sobu (H08) had some effect on the heart rate variability. Imai *et al* (8), reported that the decrease in heart rate variability depended on stimulating the pneumogastric nerves by electro-AP at ST36, and an increase in heart rate variability depended on stimulating the sympathetic nerve by electro-AP at ST25.

In this study, canine tachycardia was induced by glycopyrrolate, and the experimental animals were treated with needle-AP at PC06 and BL15 over a 20 minute period. PC06 is one acupoint from the Lung Meridian points, and it is commonly used to treat cardiovascular disorders, neurosis and epilepsy (2,12,17). Chao *et al* (2), reported the therapeutic effects of electro-AP at PC06 on the pressor response and ischemic dysfunction. Lu *et al* (12), reported the effects of electro-AP at PC06 on acute myocardial ischemia. Shen *et al* (17), showed the effect of laser-AP at PC06 on bradycardia. BL15 is one acupoint from the Urinary Bladder Meridian points, and is generally used to treat cardiac disorder, syncope and epilepsy (7,21). Hsu *et al* (7), reported the effects of electro-AP at BL15 on heart rate variability, pulse rate variability and skin conductance response. Zhu *et al* (21), demonstrated the effect of electro-AP on acute myocardial ischemic injury.

Accordingly, this study used the PC06 and BL15 acupoints. Needle-AP at PC06 and BL15 was found to be effective for canine tachycardia and respiratory rate variability. In addition, needle-AP at BL15 was more effective for tachycardia than that at PC06. Lee *et al* (10), reported that needle-AP at PC06 and BL15 are effective for assisting in the recovery from canine bradycardia, and needle-AP at PC06 is more effective than that at BL15. The present results are different from those on canine bradycardia reported by Lee *et al* (10). The reason for this difference is unclear. However, it is thought that needle-AP has capability to control with body homeostasis.

These results show that needle-AP at BL15 can be applied in clinical practice, and can reduce the side effects of drugs used for the treatment of canine tachycardia. However, more study is needed on the recovery effects of various AP methods, including injection-AP, electro-AP and laser-AP and combined treatment of various AP, as well as the effects of these techniques on natural canine patients.

In conclusion, needle-AP at PC06 and BL15 was effective for treatment of canine tachycardia, and needle-AP at BL15 was more effective than that at PC06.

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개 빈맥에 대한 내관(PC06) 및 심수(BL15) 자침의 효과

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요 약 : 본 연구는 개 빈맥에 대한 내관 (PC06) 및 심수 (BL15) 자침의 효과를 입증하고자 실시하였다. 총 18두의 비글견을 대조군 (6두), PC06 군 (6두) 및 BL15 군 (6두)로 각각 나누었다. 빈맥은 glycopyrrolate를 근육주사하여 유발하였다. 대조군은 아무런 처치를 하지 않았으나, 실험군은 glycopyrrolate투여와 동시에 각각 PC06 및 BL15에 20분간 유치하였으며, R-R 간격의 변화 및 호흡수의 변화를 측정하였다. PC06군과 BL15군에서의 R-R 간격은 대조군에 비하여 유의성 있는 증가를 나타내었으며, BL15군의 R-R 간격은 PC06군에 비하여 유의성 있는 증가를 나타내었다. PC06군의 호흡수는 대조군과 비슷한 경향을 나타냈으나 BL15군은 대조군 및 PC06군에 비하여 유의성 있는 감소를 나타내었다. 결과적으로, PC06 및 BL15의 자침은 개 빈맥의 회복에 도움이 되며, BL15가 PC06보다 효과적인 것으로 판단된다.

주요어 : PC06, BL15, 빈맥, 개