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A PRACTICAL MODEL TO INDUCE BRADYCARDIA BY CHEMICAL ABLATION OF SINUS NODE AND BILATERAL VAGUS NERVE STIMULATION IN RABBITS, WHICH SATISFIES THE REQUIREMENT FOR BIOPACEMAKING EXPERIMENT IN VIVO

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Objectives To investigate the feasibility of the bradyarrhythmia rabbit model built by sinus node ablation and bilateral vagus nerve stimulation.

Methods 30 two-month-old Japanese white rabbits were randomly and equally divided into three groups: L group, R group and B group. Under 4~6V stimulating voltage at 2.5 Hz, 5 Hz, 10 Hz, 15 Hz, 20 Hz stimulus frequency (1 Hz=60 beats/min), rabbits in three groups received left, right or bilateral vagus nerve stimulation after chemical ablation, respectively. ECGs were used to detect the change of HR and rhythm after stimulation, time for reaching the stimulus endpoint, recovery time, and HR and rhythm during the stimulus endpoint with continued stimulation.

Results Basic heart rate significantly dropped down in those rabbits after chemical ablation with 20% formaldehyde (307 ± 21 beats/min vs 126 ± 28 beats/min, $p < 0.01$). Only one case of sinus arrest occurred under right vagus nerve stimulation at 20 Hz. Heart rate in most rabbits slowed down with the left vagus nerve stimulation. Sinus arrest and junctional escape occurred with the increasing-frequency pulse stimulation. Sinus arrest and ventricular escape beat occurred with the bilateral vagus nerve stimulation at 10 Hz or more and two cases were that 3-degree atrioventricular block. It took less time to reach the stimulus endpoint with the increase of pulse frequency for bilateral vagus nerve stimulation. There was a significant statistical difference in the time in reaching the stimulus endpoint at ≥ 10 Hz compared with 2.5 Hz ($p < 0.05$). The sinus rhythm of all rabbits restored to normal as before stimulation. But recovery time was needed with the increase of pulse frequency. There was a statistically significant difference in the recovery time at ≥ 5 Hz compared with 2.5 Hz ($p < 0.05$).

Conclusions Combination of sinus node ablation and bilateral vagus nerve stimulation can successfully establish a reliable bradyarrhythmia rabbit model, which satisfies the requirement for experiment in vivo.