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EFFECTS OF BIVENTRICULAR ELECTRIC STIMULATIONS APPLIED DURING ABSOLUTE REFRACTORY PERIOD ON CARDIAC FUNCTION OF RABBITS WITH HEART FAILURE

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Objectives To investigate the effects of biventricular electric stimulations during absolute refractory period on cardiac function and ventricular remodeling of rabbits with chronic heart failure, explore the best pattern and the safety of Cardiac Contractility Modulation (CCM).

Methods Thirty rabbits were divided into three groups: sham-operated group, LV cardiac contractility modulation (LV-CCM) group, biventricular cardiac contractility modulation (BV-CCM) group. Rabbits models of chronic heart failure were made by ligating ascending aortic root of rabbits. Then electrical stimulations during the absolute refractory period were delivered on the anterior wall of left ventricle in LV-CCM group and on the anterior wall of both left ventricle and right ventricle in BV-CCM group lasting 6 h everyday for 7 days. Changes in ventricular structure, cardiac function and electrocardiology were observed before and after CCM stimulation.

Results Compared with sham-operated group, heart weight, heart weight index, LVESD, LVEDD in LV-CCM and BV-CCM group were significantly decreased ($p < 0.05$), while their LVEF and FS were significantly increased ($p < 0.05$), especially in BV-CCM; IVS, LVPM, E wave, A wave and E/A ratio were similar among groups. Plasma BNP levels in three groups was no significant difference before CCM delivered ($p > 0.05$); However plasma BNP levels were highest in the sham-operated group, followed by a LV-CCM group, BV-CCM group were the lowest after CCM-delivered ($p < 0.05$). Holter monitoring showed that regardless whether or not CCM delivered the heart rate have no change in heart rate in LV-CCM and BV-CCM group. Compared with sham-operated group there is no increase in ventricular arrhythmias.

Conclusions Biventricular electric currents delivered during the ARP could significantly enhance the contractility of myocardium and improve cardiac function and reverse ventricular remodelling safely.