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ELECTROCONDUCTIBILITY OF POLY N-ISOPROPYLACRYLAMIDE THERMORESPONSIVE HYDROGEL INHIBITS THE OCCURRENCE OF MALIGNANT ARRHYTHMIAS POST MYOCARDIAL INFARCTION

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Objectives Recentresearch porved the protective effects of synthesizced hydrogels (Gels) formyocardial infarction (MI) animals due to the inhibition of ventricularremodeling. However, cardiac malignant arrhythmia is one of the most seriouscomplications after MI, but the exact mechanism underlying the increased vulnerabilityof arrhythmias is not clear. Synthesised hydrogel, as a kind of non-bioactivematerial, whether hydrogel intra-myocardium injection could result in electrical reentry between the non-bioactive material and the infarcted myocardium or not, it

is sill under controversy. The present study was performed to investigate the alteration of electrophysiological characteristicsin infarcted myocardium after Gel injection at the acute phase of MI.

Methods NewZealand White Rabbits (2.5±0.5 Kg) were used and divided into sham operation (SO) group accepted Gel or phosphate-buffer saline (PBS) and MI group acceptedGel or PBS. After left anterior descending coronary artery (LAD) was ligated, 200 μl 3% (w/v) Gel or PBS soulation was injected around the infarcted myocardiumby intra-myocardium injection. Rabbits in SO groups were subjected to the sameprodecure except that the silk suture around LAD was loose. Effective refractory period (ERP), monophasic action potential durationat 90% repolarisation ($MAPD_{90}$) and transmural dispersion of repolarisation (TDR) were measured in three layers myocardium respectively by programmed electrical stimulation at 30 min, 3 h, and 6 h after injection. Arrhythmias were recorded by surface electrocardiogram during the surgery.

Results Data manifested that ERP of left ventricle was significantly shortened post-MI, but the alteration can be reversed after Gel injection. $MAPD_{90}$ in infarcted myocardium was significantly shortened, especially in mid-myocardium. Gel can homogeneously prolong $MAPD_{90}$ in three layers of myocardium and consequently, Gel inhibited repolarisation heterogeneity post-MI. In addition, Gel blunted the increasing of TDR post-MI and the effects were continuously enhanced as time goes on. Besides that, arrhythmias score indicated the use of Gel obviously reduced the occurrence of ventricular malignant post-MI.

Conclusions As non-bioactive biomaterial, poly N-isopropylacrylamide thermoresponsive hydrogel injected into normal ordamaged myocardium is safe. Additonally, intra-myocardium injection of the thermoresponsivehydrogel could promote electrophysiological repair of infarcted myocardium dueto the amelioration of electrical heterogeneity among the three lays of myocardium. We deem that the thremoresponsive hydrogle potentially inhibit malignant arrhythmias by reducing reentry, furthermore, it is a suitable consideration for MI thearpy stratergy.