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Efficacy of extra-pericardial leads of implantable cardioverter-defibrillator in ventricular arrhythmia after acute myocardial infarction in large animal model (clinical application of new and novel extra-cardiac/extra-pericardial electrophysiology approaches)

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Introduction & Aim: Both experimental and clinical data have demonstrated a high risk of ventricular arrhythmia in the early post-myocardial infarction (MI) phase. The indications for implantable cardioverter-defibrillator (ICD) have rapidly expanded over the past ten years in acute MI. However there are many factors may prohibit transvenous ICD lead placement. The aim of this study was to evaluate the impact of extra-pericardial placement of ICD leads for treating ventricular arrhythmia. In one porcine model the effectiveness of this treatment was studied by creating acute MI in the LAD territory.

Methods: *In vivo* studies were performed in 9 female Yorkshire pigs (weight 46.2±6.1 kg). After mini-thoracotomy or completely minimal invasive procedure the first custommade bipolar pacing lead were sutured to the subcutaneous tissue of the left ventricle (LV) and the second to extra-pericardium at the level of the right atrial appendage without opening pericardium. The ICD generator was placed into pocket below xyphoid process. In one porcine model an acute MI was created by proximal ligation of left anterior descending artery that resulted in spontaneous ventricular fibrillation which was successfully detected and treated by the device.

Results: All ICD systems had acceptable defibrillation thresholds with energy tested at 27J and 37J. There were no increase impedance between the coil and generator. There were no inappropriate discharges. Two Porcine models successfully converted VF to the sinus rhythm at 27J and 7 converted to sinus rhythm at 37J. Mean R-wave amplitude (9.6 mV), mean pacing impedance (1030 ohms), mean threshold (5.0v @ 1.0ms) and first shock efficacy (78%).

Conclusion: Extra-pericardial placement of ICD leads in acute myocardial infarction has demonstrated good performance with stable defibrillator energy and impedance. This new technology can overcome the potential limitations of the currently available intravenous and sub q devices. We are also going to discuss novel electrophysiology approaches of extra-pericardial electrophysiology.

Biography

Jeko Madjarov is board certified in General, Vascular/Endovascular and Cardiothoracic Surgery. His clinical interests include adult cardiac and thoracic surgery, aortic surgery, including complex/endovascular aortic repair and minimally invasive coronary and thoracic surgery. He is a key Member of the complex lead extraction program in the Department of Cardiac Electrophysiology. He has several patents in the field of diagnosis and treatment of cardiac arrhythmias, endovascular treatment of aortic disease, and complex chest wall reconstruction. He has received his Medical degree from Sofia Medical University, Bulgaria, and completed a Cardiac Surgery Residency at St. Ekaterina University Hospital, Sofia, Bulgaria. He has completed General Surgery residencies at Yale-New Haven Hospital, New Haven, CT and Baystate Medical Center/Tufts University School of Medicine, Springfield, MA. He has then completed Fellowships in Vascular/Endovascular Surgery and Cardiovascular/Thoracic Surgery at Carolinas Medical Center, Charlotte, NC. He has authored more than 20 publications.

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