REDUCTION IN ULTIMATE INFARCT SIZE DESPITE PERSISTENT EPICARDIAL OCCLUSION USING THREE DIMENSIONAL TRANSTHORACIC ULTRASOUND AND INTRAVENOUS NON-TARGETED MICROBUBBLES

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Background: Despite improvements in epicardial recanalization (ER) rates in acute myocardial infarction (AMI), infarction still occurs in 65% of patients due to failed microvascular reflow. Transthoracic diagnostic ultrasound (TDUS) and intravenous microbubbles (IV MB) can recanalize microvascular thrombi in AMI, and we sought to determine whether reductions in ultimate infarct size (UIS) could be achieved with this technique.

Methods: In 12 pigs with acute left anterior descending thrombosis, changes in UIS were examined before and after fibrinolytic therapy (Tenecteplase 1mg/kg; Genetech). Six of the pigs were randomized to receive a continuous infusion of IV MB (NuVox) with guided high mechanical index (MI) impulses from a three dimensional TDUS probe (Philips 3-1 MATRIX array) applied to the risk area for 30 minutes. UIS was assessed before and 90 minutes after therapy in both groups, and defined as the size of the contrast defect at plateau intensity during low MI imaging.

Results: UIS prior to randomization was similar between groups (2.69 ± 0.33 vs. 2.78 ± 0.30 cm²). Despite equal ER rates (2/6 for both groups at 90 minutes), pigs randomized to guided high MI impulses and IV MB had significant reductions in UIS (1.52 ± 0.70cm² decrease for TDUS /IV MB with TNK vs. 0.43 ± 0.33 cm² decrease for TNK alone; p=0.006). This decrease in UIS was also evident in the pig subset without ER (p=0.017; see Figure).

Conclusions: TDUS and IV MB restore microvascular flow and prevent infarction in AMI independent of whether ER occurs.