OPTIMIZATION OF ATHEROSCLEROTIC PLAQUE FORMATION IN SWINE CORONARY ARTERY MODEL

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Background: The present study was to identify parameters that are related to optimal established vulnerable plaque formation in the porcine model.

Methods: All pigs were fed chow containing 1% cholesterol, 5% lard and 1.5% sodium cholate. Diabetes mellitus was induced by 125 (n=6) or 150 (n=8) mg/kg of intravenous streptozotocin (STZ). Arteries were randomized to balloon injury vs. non injury groups. Fd-OCT (fourier domain-optical coherence tomography) and IB-IVUS (integrated backscatter-intravascular ultrasound) images were regularly obtained to monitor coronary plaques. If plaques were detected, coronary arteries were excised and divided each 5mm segments. The independent factors influencing coronary plaque formation were determined by multiple logistic regression analysis.

Results: A total of 503 segments were analyzed. 214 segments had atherosclerotic plaques. 67.8% of plaques had lipid rich necrotic core and fibrous cap. Among those, 64 lesions had a thin fibrous cap with a necrotic core. After logistic regression analysis, the strongest independent predictors of plaque formation were higher STZ dose, higher total cholesterol level, balloon injury, and shorter distance from ostium.

Conclusions: We provided a practical animal model of advanced atherosclerosis with occasional human-like vulnerable plaque morphology in very short preparation time.