INTERNATIONAL SOCIETY FOR COMPUTERIZED ELECTROCARDIOLOGY
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Electrocardiographic, Hemodynamic and Acoustical Findings in an Experimental Model of Myocardial Ischemia

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Introduction: Acute myocardial ischemia often displaces the ST segments in the ECG. However, since the specificity and sensitivity for ischemia of ST segment displacement are imperfect, echocardiography and radionuclide studies are often used to augment the ECG in evaluating patients for ischemia. Ischemia also has hemodynamic effects that include reduced left ventricular (LV) contractility and compliance. These hemodynamic changes are typically associated with a third and fourth heart sound (S3 and S4), respectively. The purpose of this study was to study the relationship of the ECG, LV pressures and cardiac acoustical findings in experimentally induced ischemia. Methods: We induced ischemia in 10 anesthetized pigs by balloon occlusion of the left anterior descending coronary artery. Before, during and after each occlusion, we simultaneously recorded acoustical data from near the ECG V4 position, LV pressure and an ECG tracing. Results: During balloon occlusion, all 10 pigs developed ST segment elevation and increased left ventricular end-diastolic pressure (LVEDP) with a prominent "a" wave. They also exhibited the appearance or the intensification of heart sounds as follows:

Baseline	N	Ischemia
No S3 or S4	5	New S3 and/or S4
Soft S3	4	Louder S3; new S4
Soft S4	1	Louder S4; no S3

Conclusion: Detecting and recording heart sounds may improve the identification of acute myocardial ischemia as the cause of ST segment abnormalities.