



Imaging

VENDOR SPECIFIC AND INDEPENDENT QUANTITATIVE ANALYSES OF REGIONAL STRAIN BASED ON 4D ECHOCARDIOGRAPHY OF NORMAL SIMULATED CARDIAC MOTION AND INFARCTION AS VALIDATED BY SONOMICROMETRY

Poster Contributions

Poster Sessions, Expo North

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Background: Three-dimensional echocardiography derived strain determinations have become increasingly used to assess cardiac function. This study examined the efficacy of a vendor-independent 3D/4D strain analysis program compared to a manufacturer produced analysis package specific to one brand of ultrasound system images and sonomicrometry.

Methods: Five adult pig hearts were passively pumped to simulate normal cardiac motion at stroke volumes (SV) ranging from 30-70ml. A 3V-D matrix probe interfaced with a GE Vivid E9 ultrasound system was used for imaging. After baseline imaging, 2ml glutaraldehyde was injected in the mid-anterior (MA) segment of each heart to simulate a myocardial infarction (MI). EchoPac (GE) and TomTec Image Arena were used to quantify circumferential and longitudinal strain (CS, LS) at MA for each SV pre- and post-MI. Strain values were compared to the relative displacement of sonomicrometry crystals.

Results: Linear regression analyses showed excellent correlation in both CS and LS between both analysis packages and sonomicrometry with R² values ranging from 0.73-0.85. Bland-Altman plots for CS and LS validate that all methods acquired comparable values. It was also determined that both analysis packages were able to detect a decrease in CS and LS post-MI at all SVs in the affected region.

Conclusions: Both EchoPac and TomTec Image Arena were shown to be robust utilities with the ability to accurately obtain quantitative regional strain values from 4D echo volumes.

