CAN NON-VARIABILITY OF SPECT-OBTAINED LVEF AND ITS RELATIONSHIP WITH SUM STRESS SCORE DIFFERENTIATE NORMAL FROM ABNORMAL SCANS?

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PURPOSE OF THE STUDY

Purpose: Left ventricular ejection fraction (LVEF) is a universally used parameter for clinical management and prognostication in cardiology practice. Gated SPECT-obtained LVEF adds incremental prognostic value on survival when combined with sum stress score (SSS) data. However, it is necessary that different software provide uniform data. Here we report variation of LVEF values using three different types of software.
EF and ESV – powerful prognostic tools

Cross-sectional studies don’t reflect longitudinal performance

Gottdiener JS, JACC. 1996

1300 LV grams in GUSTO-1 study

Migrino R, Circulation 1997
LV Ejection Fraction

Mortality (%) vs. Echo LVEF (%)

- <30%
- 30-39%
- 40-49%
- 50-59%
- >60%

Volpi A et al. Circulation 1993;88:416

LVEF and mortality
METHODS

Subjects

- 37 human subjects without evidence of reversible myocardial ischemia (Controls) and 13 patients with evidence of reversible myocardial ischemia (Patients) were included.

AGE

- Ages of the two groups respectively were 59±10 and 62±9 yrs with 22 females in the former group and 3 females in the latter group.

Spect

- SPECT images, acquired on multi-head detectors with either Technetium-99m based MIBI (n=24) or Tetrofosmin (n=26), were post processed using ECToolbox (ECTb), Myovision (GE Health Care), and QGS/QPS soft wares embedded in Xeleris 2 (GE).
RESULTS

Data obtained by independent sample t test: P<0.05 is considered significant
Results Contd: Correlation between SSS and LVEF in subjects with reversible myocardial ischemia
Example of a Normal scan by QGS/QPS
Low 4-year "survival" according to ECTBox in a normal scan
Abnormal scan as registered in a patient (CABG) using QGS/QPS
Myovision data in the same "abnormal" scan (Post CABG)
Stress Defect (% of total myocardium or coronary territory):

- Total: 39% 0% 0% 0% 0% 39%
- LAD: 50% 0% 0% 0% 0% 50%
- LCX: 10% 0% 0% 0% 0% 10%
- RCA: 53% 0% 0% 0% 0% 53%

Reversibility (% of total def or def in coronary territory):

- Total: 41% 0% 0% 0% 0% 41%
- LAD: 0% 0% 0% 0% 0% 0%
- LCX: 30% 0% 0% 0% 0% 30%
- RCA: 10% 0% 0% 0% 0% 10%

There are 217 pixels blacked out (39%), of 561 total pixels

Stress Total Severity Score = 1023
Rest Total Severity Score = 970
Reversibility Total Severity Score = 46

Probability of Survival:
1 yr: 81%
2 yr: 77%
3 yr: 63%
4 yr: 42%
We conclude that a combination of LVEF and SSS could be useful to differentiate between normal and abnormal scan.

The variation of LVEF values in the Controls may not have any clinical significance because of the large (55%-90%) "normal" range of this functional variable.

However, such variations in subjects with reversible myocardial ischemia may affect the clinical decision making process.

Though relatively small number of Patients precludes us to comment further on this issue, it is probably desirable to have uniform cross talk among the soft wares.

CONCLUSIONS
In the Patient group no variation was observed (lowest LVEF was 44±12% vs. 59±12 in Controls by stress QGS/QPS; p<0.0001).

SSS in the former group was 3±3 and in the other group 13±7 (p<0.01). Significant negative correlation was found between SSS and QGS/QPS-obtained stress LVEF in the Patient group (r=-0.6; p<0.05).

No such correlations were found in either group in any of the other software-based data either at rest or during stress.
FINAL CONCLUSIONS

- Mortality data base in the ECtBox SW is misleading
- Since LVEF data along with SSS is a better marker of survival
- Other SWs also should provide SSS, SDS data
- Motion defect and the thickening defect in the QGS/QPS SW is also misleading
- Myovision SW has multiple options thereby making it probably more robust among the 3 SW