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Do ECG Abnormalities pose the same risk for Women and Men ?

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Background & Objective

Background: While there are known differences in ECG measurements between men and women, there is controversy regarding the gender differences in the prevalence and prognostic value of the standard ECG diagnoses. The few available studies suggest that there are significant gender differences in the prevalence of ECG abnormalities and also the relative risks they confer. Despite this, routine ECG interpretation does not take this into account.

Objectives: To compare the prevalence and prognostic value of standard diagnostic criteria of the computerized ECG in men and women in a large Veteran outpatient population with follow up for cardiovascular death

Methods

Between 1987 and 2000, digitized ECGs were recorded and analyzed using the GE/Marquette computerized ECG system. ECGs were ordered at physician discretion for usual clinical indications. As of 2000, 45,855 resting were available for consideration. After removal of inpatients and those with pacemakers and WPW, 33,312 patients (29,320 men and 3,992 women) remained. Demographics were recorded (age, gender, race, weight, height, recording location) and the population was followed until 2002 as to cause of death using the California Death Index. ECG criteria considered included bundle branch block, left ventricular hypertrophy (LVH), atrial fibrillation (AF), ST depression, diagnostic Q waves, left atrial abnormality (LAA) and QT prolongation. Kaplan Meyer survival curves were plotted and age and heart rate-adjusted Cox hazard analyses performed.

Results

The mean age and BMI were (55.9+/-0.1) years and (27.5+/-0.1) for males and (56.9+/-0.1) years and (26.2+/-0.1) for females (p<0.001). With the exception of left bundle branch block (LBBB), right ventricular hypertrophy, QT prolongation and left atrial abnormality, all ECG abnormalities were at least twice as prevalent in males compared to females. After a mean follow up of 7.5 years, the annual mortality was 1.1% for males and 0.6% for females (P< 0.001). All ECG abnormalities had significant hazard ratios (HR) in men of 2 or greater except for right bundle branch block, AF and left axis deviation. In females, only LVH and ST depression were associated with a significant HR of 2 or more while LBBB demonstrated a HR of 1.2 (see **Table 2**).

Table 1. Prevalence of ECG abnormalities in males and females

ECG Criteria	Male Prevalence	Female Prevalence	population prevalence
RBBB	3.7	1.3	3.4
LBBB	1.3	1.3	1.3
IVCD	3.1	0.9	2.8
Atrial Fibrillation	2.7	1.4	2.5
LAE	3.3	3.9	3.4
Q waves	11.7	7.5	11.2
RVH	0.3	0.2	0.3
LVH	5.2	1.9	4.8
RAD	2.3	1.7	2.2
LAD	9.5	4.3	8.8
ST depression V5	9.2	6.7	8.9
QTC >450	11.6	14.7	12.0

The table above compares the prevalence of ECG abnormalities between men and women in our dataset. While women were less likely to have RBBB, Atrial Fibrillation, Q waves, LVH, ST depression, and left axis deviation, they had a higher prevalence of abnormal corrected QT duration.

Prevalence of ECG Abnormalities by age decade

Figure 1. Females

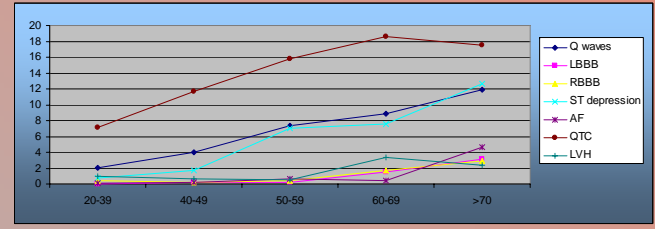
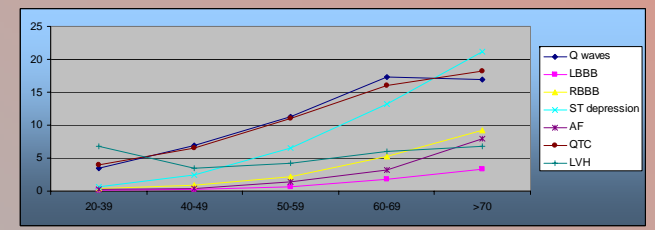


Figure 2. Males



As we can see from Figures 1 and 2, the prevalence of ECG abnormalities in both men and women increases with age. As expected, ECG predictors of myocardial damage (LBBB, Q waves) are more prevalent in men at younger ages. However, in older women, the prevalence of LBBB and Q waves reaches similar levels as the males.

Table 2. Cox Hazard Regression of ECG abnormalities in Men and Women

ECG Criteria	Male Hazard Ratio	Probability	Female Hazard ratio	Probability
RBBB	1.3	0.003	1.8	0.131
LBBB	2.5	0.000	1.1	0.002
IVCD	1.8	0.000	1.2	0.786
Atrial Fibrillation	1.4	0.000		
LAE	2.0	0.000	1.6	0.068
Q waves	2.0	0.000	1.4	0.090
RVH	2.8	0.000	1.0	0.969
LVH	2.4	0.000	3.0	0.000
RAD	1.8	0.000	1.9	0.153
LAD	1.3	0.000	1.3	0.239
QTC >450	1.9	0.000	1.1	0.690
ST depression in V5	1.9	0.000	2.8	0.000

The table above shows the age and heart rate adjusted cox proportional regression of the various ECG abnormalities. The HR for women is markedly less for LBBB, RVH and QTC as compared to men. ST depression also conferred a greater risk in women than men with a HR of 2.8 vs 1.9

Conclusions

In this veteran population, there were significant differences between men and women in the prevalence and prognostic value of classic ECG abnormalities. While LVH was associated with a similarly high HR for both men and women (2 to 3 fold increase), LBBB, RVH and prolonged QT only had significant HR (greater than 2) in men. ST depression, however, had a significantly increased HR for women compared with men.