

## Gender Differences and Arrhythmias

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## Objective

- The purpose of this talk is to address important gender differences with respect to arrhythmias.

## The issue

- Gender differences affect the prevalence, presentation, treatment, and prognosis of various arrhythmias.
- Potential mechanisms include: differences in cardiac anatomy as well differences in the ways that drugs, hormones, etc. affect cardiac ion channels by gender.
- Women are treated differently in the health care system.

## EKG differences

- Women have a higher resting heart rate than men due to intrinsic differences of the sinus node.
- Women have lower QRS voltages than men (even after adjustments for differences in LV mass and body weight). Therefore, LVH criteria must be gender specific.
- Women have longer QT intervals than men. (ULN is 0.47 versus 0.45)

Heart. 1920;7:353-370  
Hypertension. 1995;25-242-249.

## Arrhythmias and Pregnancy

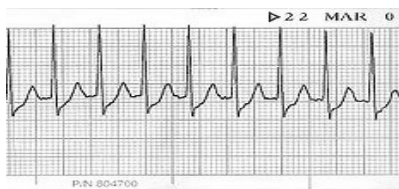
- Increase in resting heart rate
- Increase in circulating volume leads to an increase in myocardial irritability.
- Increased incidence of SVT during pregnancy.

## Gender and Prevalence of SVT

- AV nodal reentrant tachycardia is more common in women.
- WPW is more common in men.
- AF and VF occur more frequently in men with WPW.

Am J Cardiol. 1992; 70: 1213-1215.

## SVT



## Hormones and SVT

- Women are more likely to experience SVT during the premenstrual phase of their cycle.
- Rosano et. al studied 26 women with SVT and found an increase in the number and duration of episodes of SVT on day 28 as compared to day 7 of their cycle.
- Mechanism: low estrogen, increased progesterone, rise in body temperature, and increase in ventricular ectopics.
- Considerations made in timing of EP study.

Lancet. 1996 Mar 23;347(9004):786-8.

## Referral for Catheter Ablation

- Women are more symptomatic in SVT and often have a faster heart rates than men.
- No differences in the success rate, complications, or rate of recurrence between men and women.
- However, they are referred for ablation on average 28 months later than men and after having been given more antiarrhythmic drugs.
- Multiple possible explanations include: misinterpretation as panic disorder.

J Am Coll Cardiol. 2003 Sep 17;42(6):1103-7.  
Arch Intern Med. 157 (1997), pp. 537-543

## Atrial Fibrillation

- The prevalence of atrial fibrillation (AF) at all ages is higher in men than in women.
- However, as women live longer than men, the absolute number of women with AF is equal to or greater than men.
- Women are more likely to experience longer, more symptomatic episodes, frequent recurrences, and significantly higher ventricular rates than men.
- Women have higher morbidity with AF than men.

Circulation. 2001;103:2365-2370.  
Am J Cardiol. 2000;86:764-768.

## Atrial Fibrillation

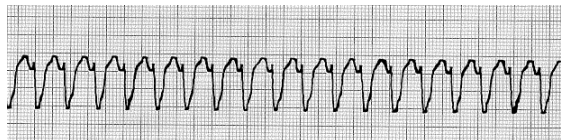


## Atrial Fibrillation

- Women have higher risk of stroke as compared to men (esp > 75)
- Less women are treated with coumadin.
- Less women are referred for rhythm control strategies- i.e. cardioversion and/or catheter ablation and if they are referred, it is much delayed. Despite similar risks and arguably more benefits.

Stroke 1999;30:1223-1229.  
Circulation. 2005;112:1687-1691.  
J Am Coll Cardiol. 2007;49:572-577.

## Ventricular Tachycardia



## Ventricular Arrhythmias and SCD

- Less women die of SCD than men
- More women who suffer out of hospital arrest have a presenting rhythm of PEA or asystole.
- LVEF of < 40% is the strongest predictor of total and cardiac mortality in men, but does not have the same significance in women.
- Men and women are different and we can generalize findings across genders.

## Idiopathic Ventricular Arrhythmias

- RVOT VT was 1.5 times more frequent in women as compared to men, while LVOT VT were more frequent in men.
- The ablation success rate for RVOT-VA (88%) was higher than that for LVOT-VA (58%)

## ICD Therapy and Women

- Most of the landmark trials of ICD therapy included less than 20% women.
- Data from a sample of Medicare beneficiaries who met criteria for ICD implantation revealed that only 8.6/1000 women received an ICD compared with 32.3/1000 men within 1 year of diagnosis.



ICDs treat dangerously fast rhythm disorders.

Arch Intern Med. 2009;169:1500-1506.

## Long QT syndrome

- Men are more likely to die of SCD related to Long QT prior to age 15.
- After puberty, women with long QT have a 3 fold increased incidence of SCD possibly due to relative effects of estrogen versus testosterone.
- Women account for majority of cases of drug induced torsades.

Circulation. 1998;97:2237-2244.  
Am J Cardiol. 2003;91:39D-44D.

## Conclusion

- There are gender specific differences in EP.
- We need to respect these differences when designing trials to evaluate therapy.
- We need to be aggressive in referring women for therapy when indicated.

## CRT and Women

- Women respond well to CRT, if not better than men.
- Observational registry on gender-related differences in LV reverse remodeling revealed that overall, female gender was independently associated with a better response to CRT.
- IMPROVE HF registry, only 35% of indicated female patients initially had a CRT device, which improved to 65% with increased physician education at 24 months.

PACE 2007;30:1348-1355.  
JACC 2005;46:497-504.