



**Challenges in The Evaluation of
Heart Disease in Women**

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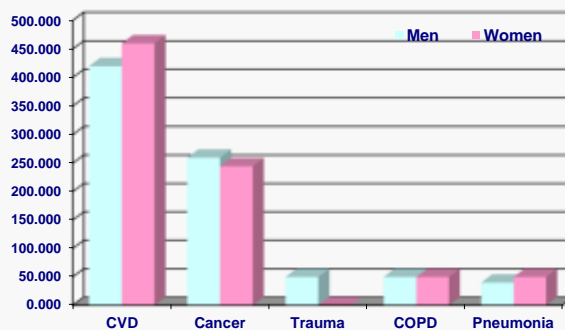
Introduction

Coronary artery disease (CAD) is the number **one** cause of morbidity and mortality in women.

Cardiovascular disease (including CAD) kills nearly 500.000 women each year.



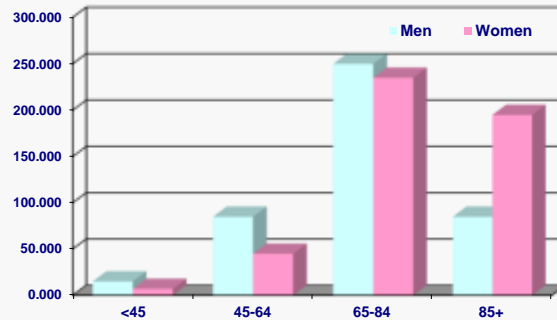
Leading causes of death in men and women



Data from the National Center for Health Statistics 1992.



Deaths Due to Cardiovascular Disease



After menopause, rates of mortality due to CAD nearly equal those of men.



Introduction

Optimal diagnostic and management strategies for CAD in women remain speculative.

Large trials of CAD diagnosis & treatment have not included women (or included in small number).

Women with CAD differ in terms of epidemiology, diagnostic test accuracy, and treatment efficacy.



CAD in women

underdiagnosed
Under treated

CAD in Men

(Sing et al., 2007; etc...)



CAD may be misdiagnosed in women

- Symptoms of AP in women often differ from those in men



Misdiagnosis

- Compared to men, women were more likely to have absence of chest pain or discomfort with CAD (37% vs 27%).

(Barclay, Dec., 2007)



CAD may be misdiagnosed in women

➤ Atypical presentation of CAD in women:

❖ In coronary artery surgery study (CASS)

Chest pain history can predict significant CAD

In women 72% of the time.

In men 93% of the time.

- Women tend to develop CAD & MI at an older age (~55-60 years) than men (~50-55 years).
- Women were 5-10% older at the time CAD was diagnosed.



CAD may be misdiagnosed in women

➤ Several gender-specific issues to be aware in diagnosing CAD in women:

1. By the age or presentation, women often have other disease, e.g. osteoporosis or arthritis → obscure CAD symptoms → delay diagnosis.
2. Women are more likely than men to present with atypical symptoms: Epigastric pain, SOB, Nausea, fatigue → Delay seeking medical advice.



CAD may be misdiagnosed in women

➤ Several gender-specific issues to be aware in diagnosing

CAD in women (contin...):

3. Chest pain in women → attributed to other causes, e.g. anxiety, stress, psychological problems, heart burn, or non-cardiac conditions Not only by women patients, but also **by their physicians**.

➤ Women with AP → more likely to have middle or upper back pain, neck pain, jaw pain, SOB, PND, indigestion, loss of appetite, weakness or fatigue and palpitations.

➤ Women had greater number of symptoms associated with AP (2.6 vs 1.8 in men).



CAD may be misdiagnosed in women

Age play important role in any gender-based differences in CAD presentation with old age

Less frequent reporting of chest pain

Women with CAD typically **OLDER** than men with ACS.

➤ Women are 10 years older than men at the time of initiated ACS associated with → comorbid conditions such as DM and hypertension.

(Barclay, Dec. 2007)



Cardiac Risk Factors in women



TIMI Score

- Age \geq 65 years.
- \geq 3 CAD risk factors (\uparrow chol, FHx, HTN, DM, smoking).
- Prior CAD (cath stenosis $>$ 50%).
- ASA in last 7 days.
- \geq 2 anginal events \leq 24 hours.
- ST deviation.
- Elevated cardiac markers (CK-MB or troponin).



Cardiac Risk Factors in Women

TIMI risk scoring system for STEMI & NSTEMI

- **The higher the risk**  The higher the 30 day mortality rate.
- **Risk scores**  Identify the need for early intervention.



Steps in Diagnosing Myocardial Ischemia

1. Careful clinical history (chest pain characteristics).
2. Review pt's risk factors which have stronger predictive value in women than in men.

e.g.: a 65 year old F + typical chest pain → has **91%** chance of having CAD.

a 55-year old F + Atypical chest pain → has **32%** chance of having CAD.

A 45 year old F + Atypical chest pain → has **3%** chance of CAD.



Steps in Diagnosing Myocardial Ischemia

- **When like-hood of CAD is very high** → proceeding to cardiac catheterization with or without non-invasive testing may be appropriate.
- **Catheterization** → Anatomic information.
- **Non-invasive testing** → functional and prognostic information.



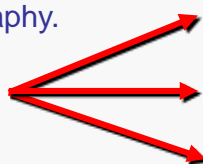
Steps in Diagnosing Myocardial Ischemia

- When the like-hood of the disease is intermediate, a rational of non-invasive imaging, first step in work-up for CAD.
- If like-hood of the disease is very low → diagnostic tests are unlikely to be helpful, clinical observation and follow up is warranted.



Steps in Diagnosing Myocardial Ischemia

Non-Invasive Tests:

- Exercise stress test (limitations)
- Echocardiography.
- MPI + Gating 
 - Rest.
 - Exercise.
 - Pharmacologic.
- PET.
- CT.
- MRI.



MPI in Women

Challenges:

- Low exercise work load
- A typical symptoms of ischemic
- Soft tissue attenuation
- Small heart

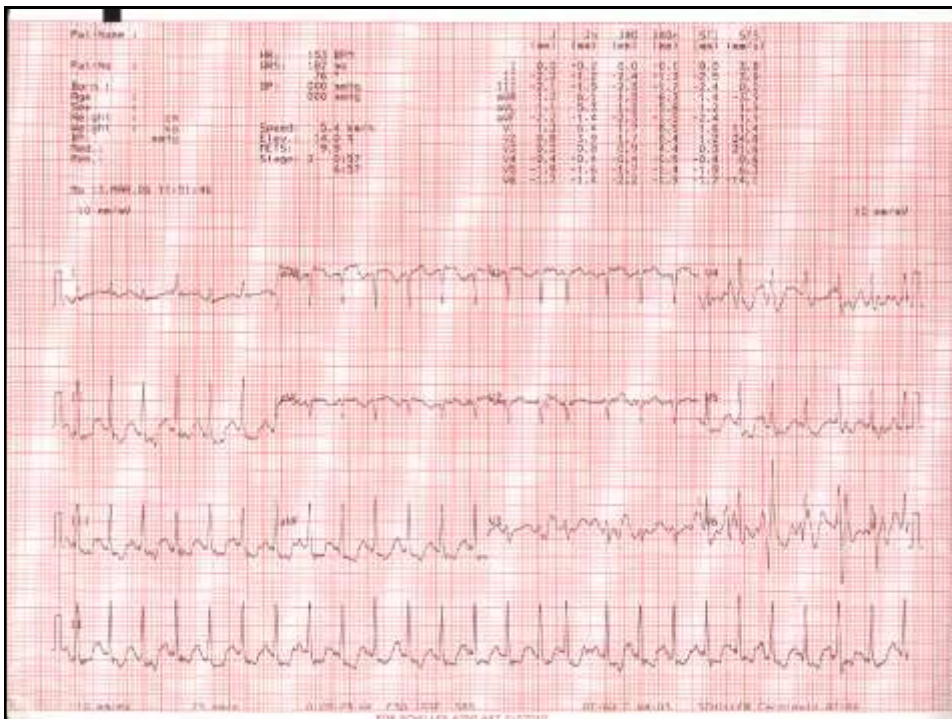
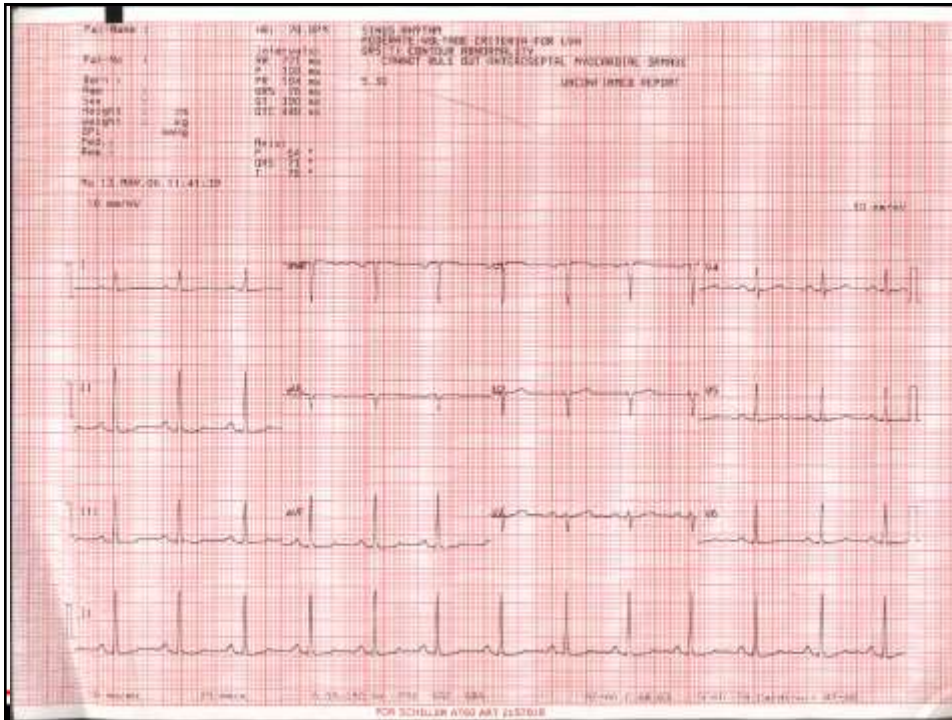


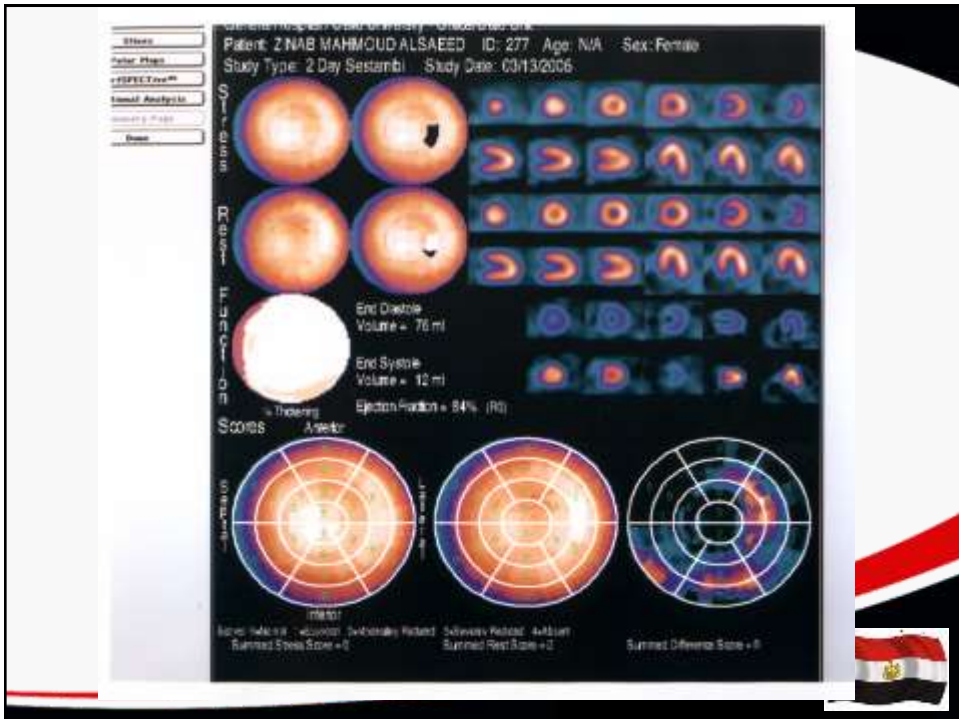
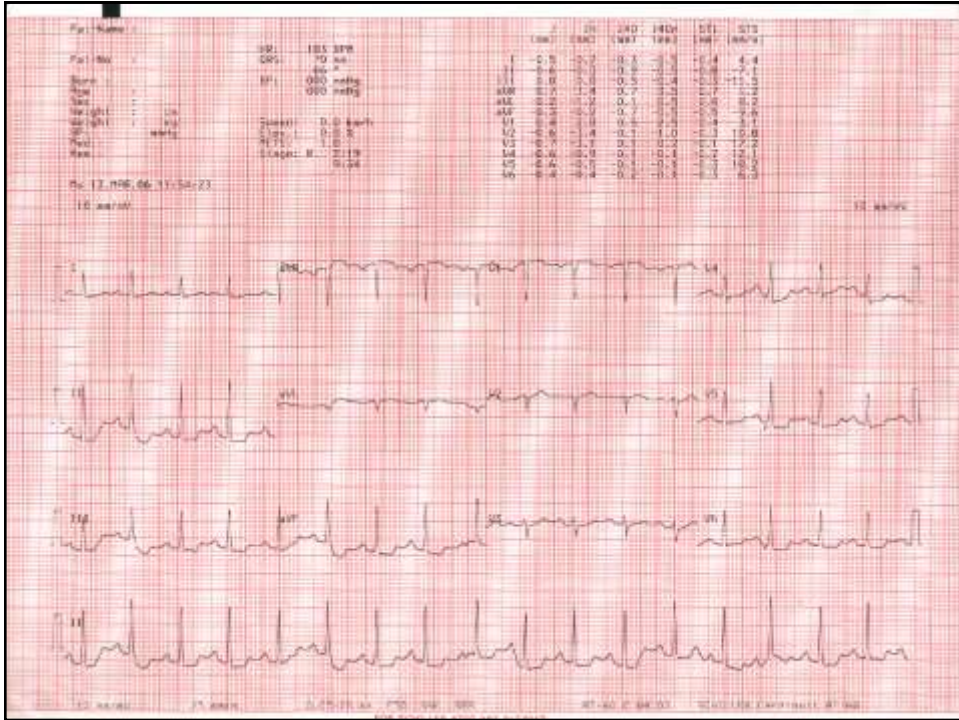
MPI in Women

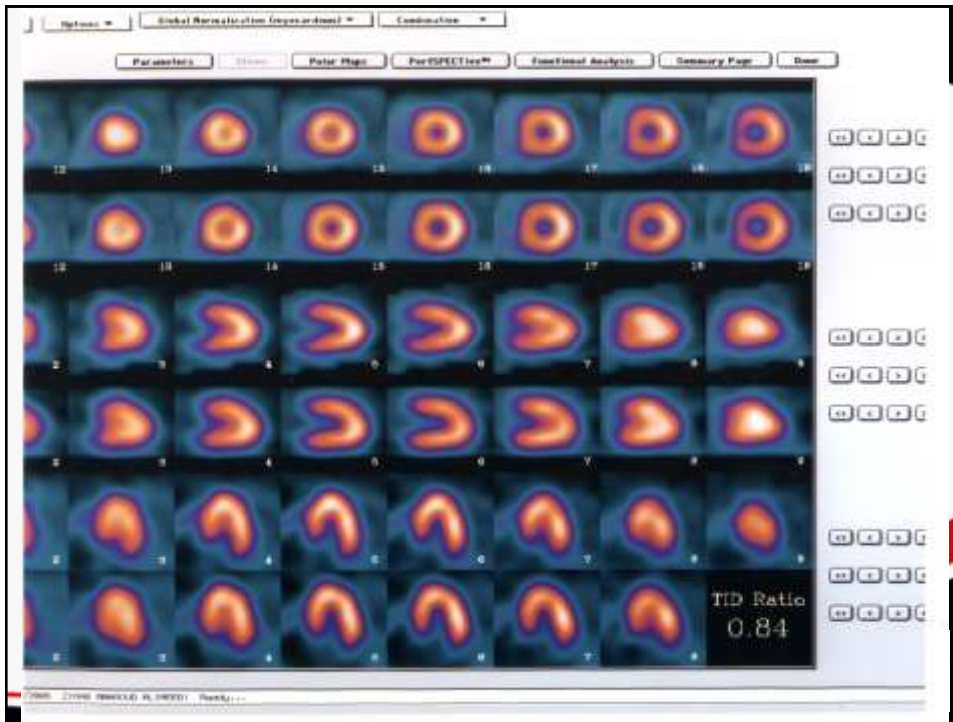
Case:

- MM, 53 y female,
- Diabetic, hypertension, chest pain for evaluation.
- **Ex. Time:** 7:15" Bruce protocol
- **Target HR:** 100%.
- **Peak BP :** 170/100.
- **ECG :**









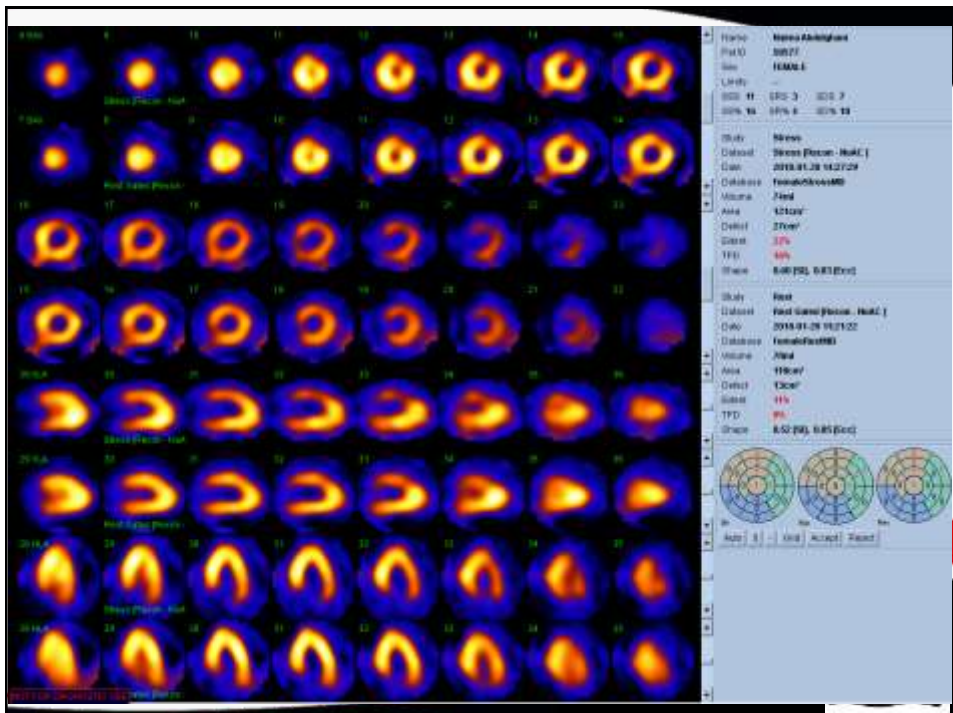
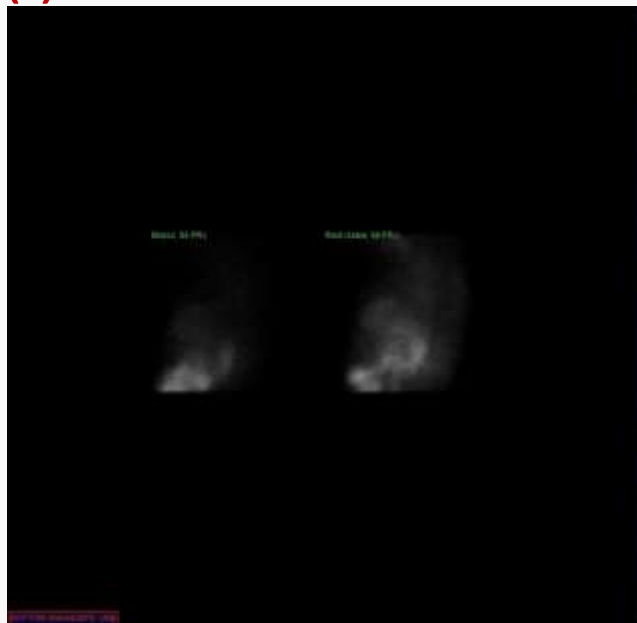
MPI in Women

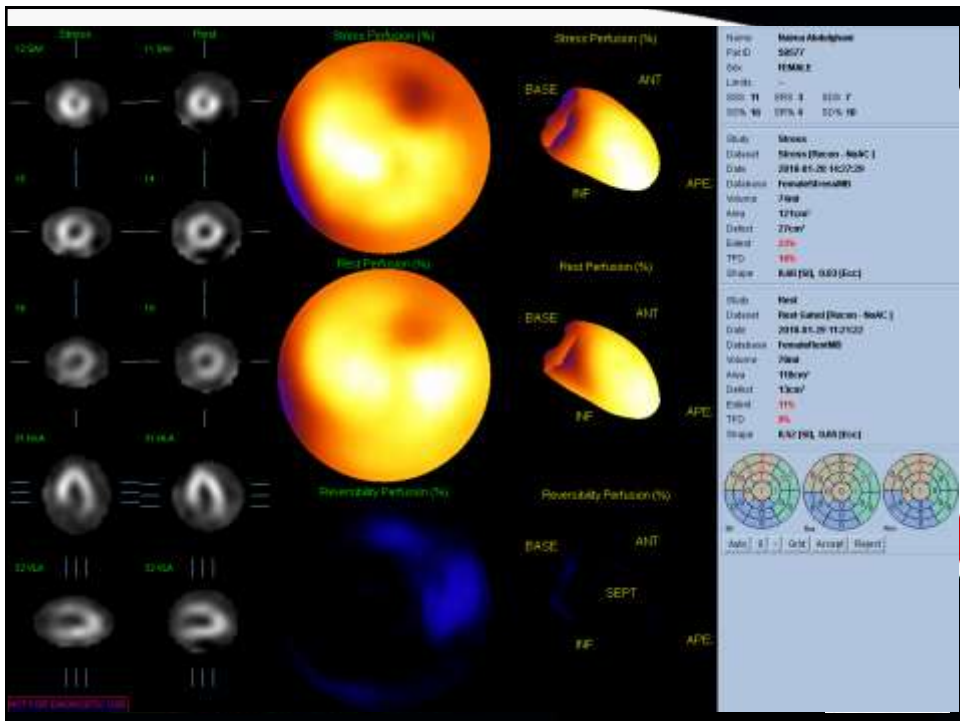
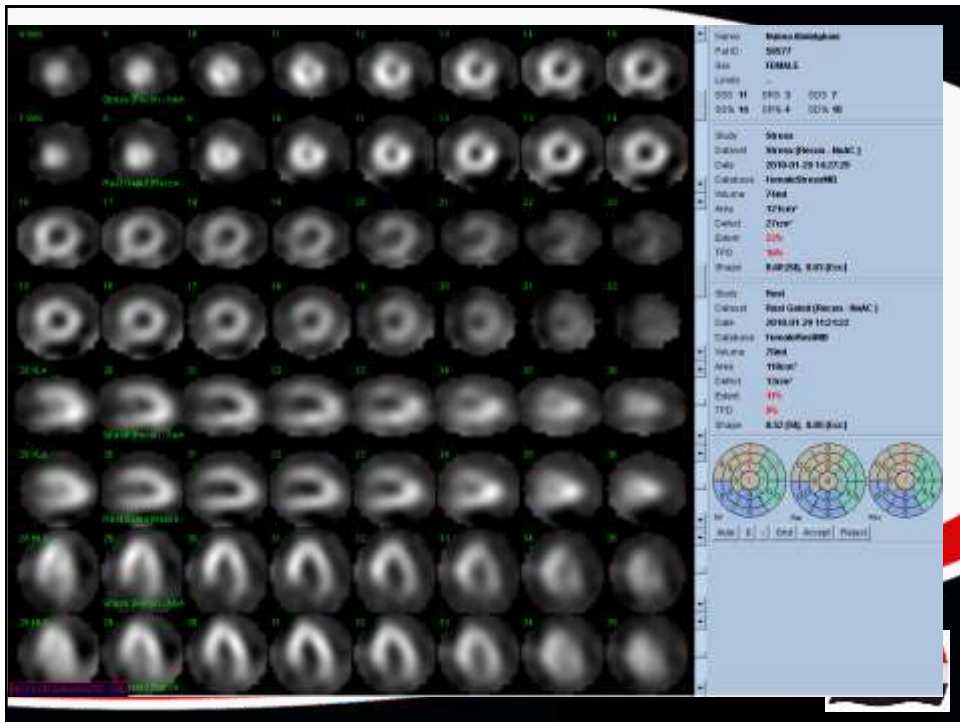
Case (2):

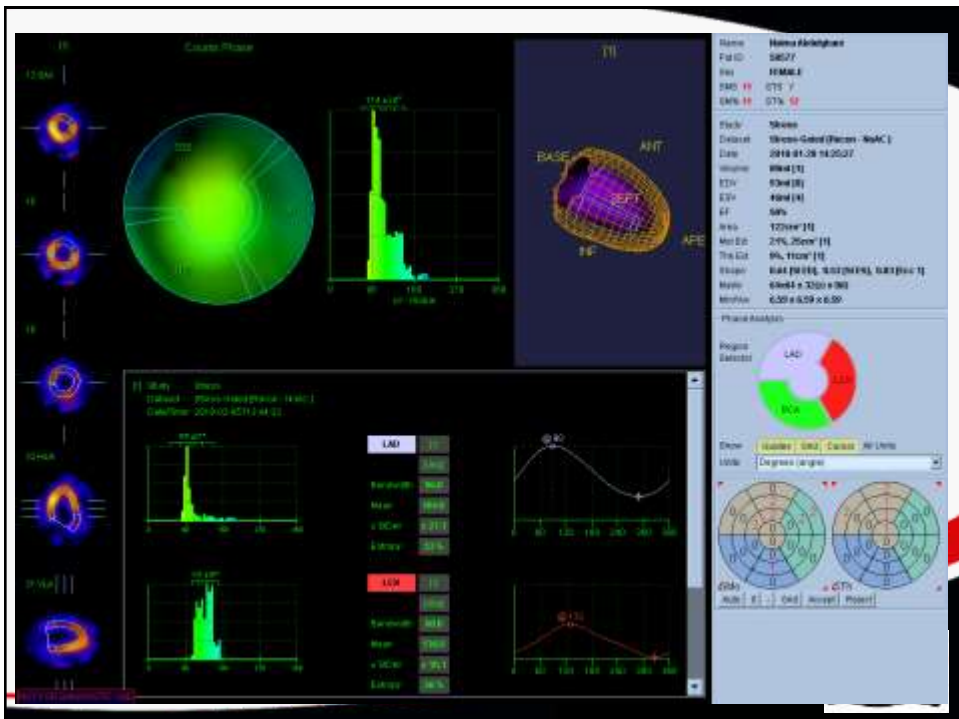
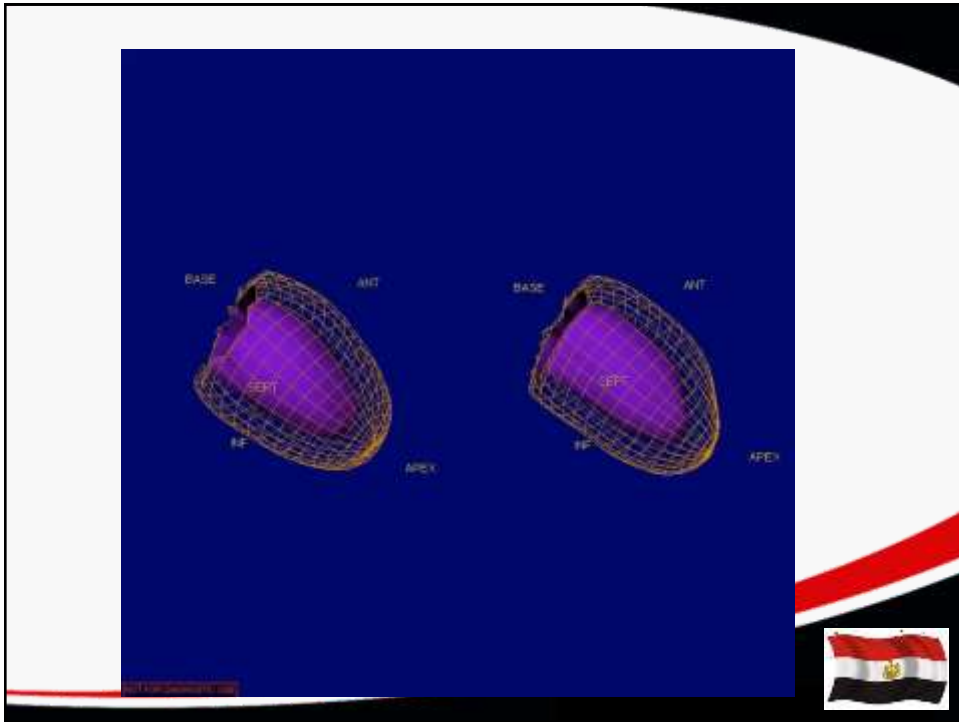
- AM, 58y female,
- Diabetic, hypertension, chest pain for evaluation.
- **Ex. Time:** 4:20" Bruce protocol
- **Target HR:** 85%.
- **Peak BP :** 160/80.

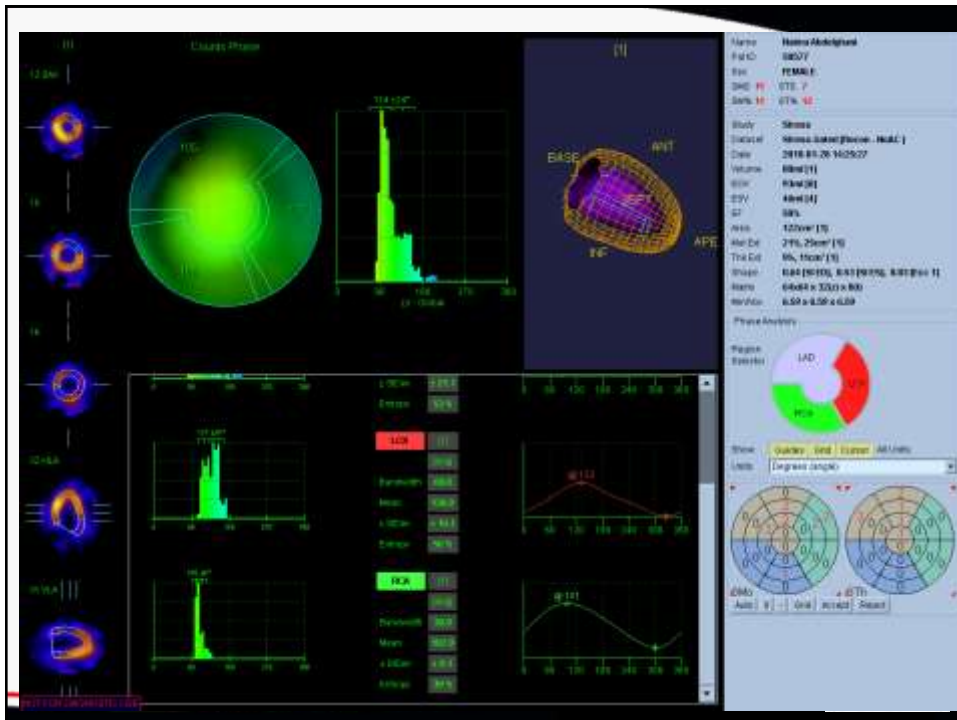


Case (2)









Gender Bias in Referrals for Diagnostic Tests

- Following abnormal MPI results, Men were 10 times more referred for coronary angiography (CA) than women. **(Tobin et al., 1987)**

- Several studies have confirmed that Men are referred more frequently for CA than are women.

(Lerner et al., 1986, Steingart et al., 1991 and Ayanian et al., 1991)



Gender Bias in Referrals for Diagnostic Tests

- In Kong et al study (1990): Only 38% of women compared to 62.3% of men were referred for CA.
- During follow up for 2 years cardiac death and MI rate was: 6.9% in women 2.4% in Men.
- Women who did revascularization they had no adverse cardiac events for 2 years.

(Kong et al., 1990)



Gender Bias in Referrals for Diagnostic Tests

Gender-based strategy:

- Reasons for lower CA rates among women are unclear, (? Misperception that CAD rarely affects women).



Gender Bias in Referrals for Diagnostic Tests

Gender-based strategy:

- To avoid unreferral of women for CA, clinician must be aware that:
 - Women can have severe CAD but present differently from men.
 - CAD therapeutic interventions can benefit such patients.
 - There is tendency towards under-referral of women for cardiac testing in general.
 - Further research is necessary to define “optimal rates of CA for men and women.



Conclusions

- CAD affects men as well as women.
- Women are more likely to present with UAP or MI than men.
- Women are 10 years older than men at the time of presentation of CAD.
- Women are more likely to have comorbid conditions such as DM & HTN.



Conclusions

- Several diagnostic pitfalls when the patient is a women.
- Non-invasive diagnostic testing is less accurate in women.
- Invasive testing is underperformed as women are less likely to be referred for CA than men.



Conclusions

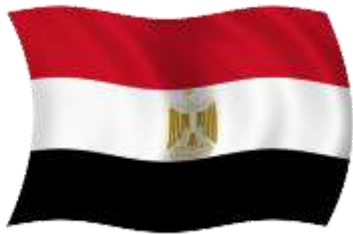
- One third of patients presented without chest pain.
- Women are more likely to present with atypical presentation for CAD.
- Increasing age is the most important predictor of CAD presentation in absence of chest pain.



Recommendations

To correct these problems clinicians must be:

1. Aware of importance of gender, age, chest pain characterizations.
2. Aware of advantages & disadvantages and accuracy of non-invasive testing.
3. Gated SPECT & soft were for quantification is highly recommended
4. Appropriate referral for CA.



Thank You