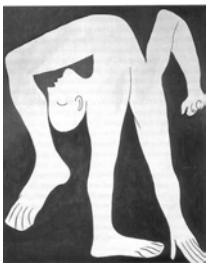
Ischemia without CAD
(Chapter 17)

- **Prevalence**
- **Causes**
- **Stress testing**
- **Therapy**
- **Prognosis**



Pablo Picasso, The acrobat

Prevalence

- **10-30% of patients with chest pain have a normal angiogram**
- **Conditions associated with non-CAD ST depression include**
  - **aortic stenosis**
  - **left ventricular hypertrophy**
  - **cardiomyopathy**
  - **mitral valve prolapse**
  - **cocaine**

Prinzmetal's Angina

- **Syndrome of vasospastic angina**
  - **Pain can occur at rest**
  - **Usually in the morning**
  - **Pain is relieved by nitroglycerin**
  - **ST depression or elevation during stress testing; depression more likely to have CAD**
  - **May have an abnormal stress test but no CAD**

Cardiomyopathy

- **Abnormal cardiac contraction**
  - **elevated LVEDP**
  - **may have chest pain and ST depression, but normal CA**
  - **experience subendocardial ischemia with elevated ventricular pressure**
  - **poor long-term prognosis**

Syndrome X

- **Microvascular Ischemia**
- **Likoff et al, 1966 first labeled it "X"**
- **Typical ischemia**
  - **relieved by nitroglycerin**
- **no CAD**
- **Cardiac blood flow does not increase appropriately**
  - **reduced vasodilatory reserve**
  - **60% are post-menopausal women**

Mechanism of Syndrome X?

- **Impaired endothelium function**
  - **endothelin does not cause VD with exercise**
  - **active substance of endothelin is nitric oxide**

Esophageal Dysfunction

- **Chest pain caused by gastro-esophageal reflux (GER)**
- **Pain is difficult to distinguish from angina**
- **60-70% of patients, pain is related to exertion**
- **May be distinguished from ischemia by having subjects fast before stress testing**

Psychological Causes

- **Hyperventilation decreases CO_2 which is a potent coronary artery VC**
- **40% of these patients have some sort of anxiety neurosis**

Stress Test Results

- **False Positive Results are most common in**
  - **Men**
    - **younger, good exercise tolerance, atypical chest pain, ST depression is seen pre-exercise with hyperventilation**
  - **Women**
    - **younger, exercise duration is not helpful, atypical chest pain, ST depression with hyperventilation, abnormal EKG at rest**

Nitroglycerin Test

- **Administer nitroglycerin before the stress test**
  - **anginal theshold is increased patients with CAD (increased exercise tolerance)**
  - **anginal threshold is not affected in non-CAD**
  - **Syndrome X, anginal threshold is decreased (decreased exercise tolerance)**

Therapy

- **Depending on the cause**
  - **Nitrates (will relieve ischemia)**
  - **Calcium Channel Blockers**
  - **Beta blockers**
- **Check for non-cardiac causes of chest pain**
  - **chest wall**
  - **esophagous**

Prognosis

- **Patients with chest pain but normal coronary arteries usually have a good prognosis**
  - **50% improved in 2 yrs (Goodin)**
  - **80% improved in 4 yrs (Bemiller)**

Conclusions

- **Patients with chest pain but normal coronary arteries**
  - **some may have CAD but missed on angiogram**
  - **some may have a neurosis or a non-cardiac cause of the chest pain**
  - **40-50%, have true ischemia**
    - **typical angina**
    - **reduced exercise capacity**
    - **relieved by nitroglycerin**

SILENT ISCHEMIA
(Chapter 19)

- **Prevalence**
- **Mechanisms**
- **Detection**
- **Prognosis**
- **Clinical Strategy**

Matisse, Flowing Hair

Prevalence

- **55% of men, the first indication of CAD is MI or death**
- **Autopsy data (asymptomatic 30-69 yr-olds) that have CAD**
  - **6% of men**
  - **2.6% of women**
- **Epidemiology data**
  - **6% of aviation personnel (mean age 36)**
  - **12% of asymptomatic men over 40 yrs**

Ischemia and Chest Pain

- **Ischemia is a late event in the ischemic cascade**
  - **75% of ischemic episodes cause no pain**
  - **the period of ischemia must last 5-7 minutes before pain is felt**
  - **wall motion abnormalities almost always precede chest pain**

Factors that influence the ischemic threshold

- **subject's pain threshold**
- **diabetes**
  - **25% of diabetics who have a heart attack had silent ischemia**
  - **with nerve damage the patient doesn't feel pain**
- **physical conditioning**
  - **exercise training can reduce or abolish exercise-induced ischemia**

Detection

- **Silent Ischemia is difficult to detect because**
  - **The patient doesn't feel pain and doesn't seek out a stress test**
  - **false negatives occur during stress testing**
    - **specificity is about 90%, 10% are missed**
  - **Artery obstruction may proceed rapidly**

Prognosis

- **Prognosis is better than patients with typical ischemia**
  - **50% better**
- **Prognosis worsens once the patient converts to typical angina**
- **Prognosis worses with other signs/symptoms during stress testing**

3 Types of Silent Ischemia

1. **Those who never have pain**
   - **defective anginal pain signaling**
2. **Ischemic pain on some occasions**
   - **majority of patients**
3. **Ischemic pain on many occasions**

The person at greatest risk may be #1, although the level of disease may be less. No warning!

Clinical Controversy

- **Common criticism against stress testing asymptomatic clients**
- **Danger of missing someone with silent ischemia**
- **Clinical strategy: to stress test persons with the classical risk factors (suspicion of risk)**

Therapy

- **Repeated episodes of ischemia cause myocardial cell death and eventually impaired ventricular function**
- **Treatments**
  - **beta blocker meds**
  - **bypass surgery, angioplasty**
  - **diet and risk factor control**

Therapy Controversy

- Do surgery on an asymptomatic patient?
  - **Wait until symptoms appear and the "axe falls"?**
  - **Surgery for prevention?**
- **The answer is unclear at this time and up to the physician and the degree of other symptoms and impairment in the patient.**

Conclusions

- **Silent Ischemia is a hot topic today**
- **The problem is detection**
  - **ischemia is a protective mechanism**
  - **it's absence increases the risk of a first-fatal cardiac event**
- **Positive stress tests should be followed-up even if the patient does not have ischemia and even though stress testing sensitivity is only 68%**