STRESS INDUCED CARDIAC DISORDERS

DR MARK HOO SANG

MAY 29, 2016

WHAT IS STRESS

- Stress is body's response to changes that create taxing demands
- Acute stress
  - Caused by a traumatic event or witnessing a traumatic event
- Chronic stress
  - Response to emotional pressure over a prolonged period of time
  - Individual perceives he/she has no control

TYPES OF STRESS

- Positive stress (Eustress)
  - Short term motivator
  - Improves performance
- Negative stress
  - Anxiety or concern
  - Feels unpleasant
  - Decreases performance
  - Perceived as outside the coping ability

WHAT IS STRESS

- Stress is the body's natural response to demands
- A state of mental or emotional strain or tension resulting from adverse or very demanding circumstances
- Positive stress can feel exciting and helps you meet your challenges
- Prolonged stress can lead to life-threatening diseases.

STRESS-INDUCED MYOCARDIAL ISCHEMIA

- 132 patients with CAD
- 48hr ambulatory ECG testing
- Correlated with a diary of emotion
- Physical activity and time of day was adjusted
- Tension, sadness and frustration induced ischemia
- >x2 risk of ischemia in the subsequent hour

STRESS AND MI

- Studies have found an increased risk of death after natural disasters
- 1994 LA earthquake
- Review of coroner's records
- Avg 4.6 vs 24 on the day of

- 16 had symptoms or death within an hour of the event
- Independent of activity
- Emotional stress may precipitate cardiac events in those people who are predisposed

MYOCARDIAL INFARCTION AND SPORTING EVENTS

- Increased MI in 1996 France vs Netherlands
- Penalty shootout
- Only seen in men
- England loss vs Argentina 1998 WC
- Admissions for MI increased 25%
- Men and women

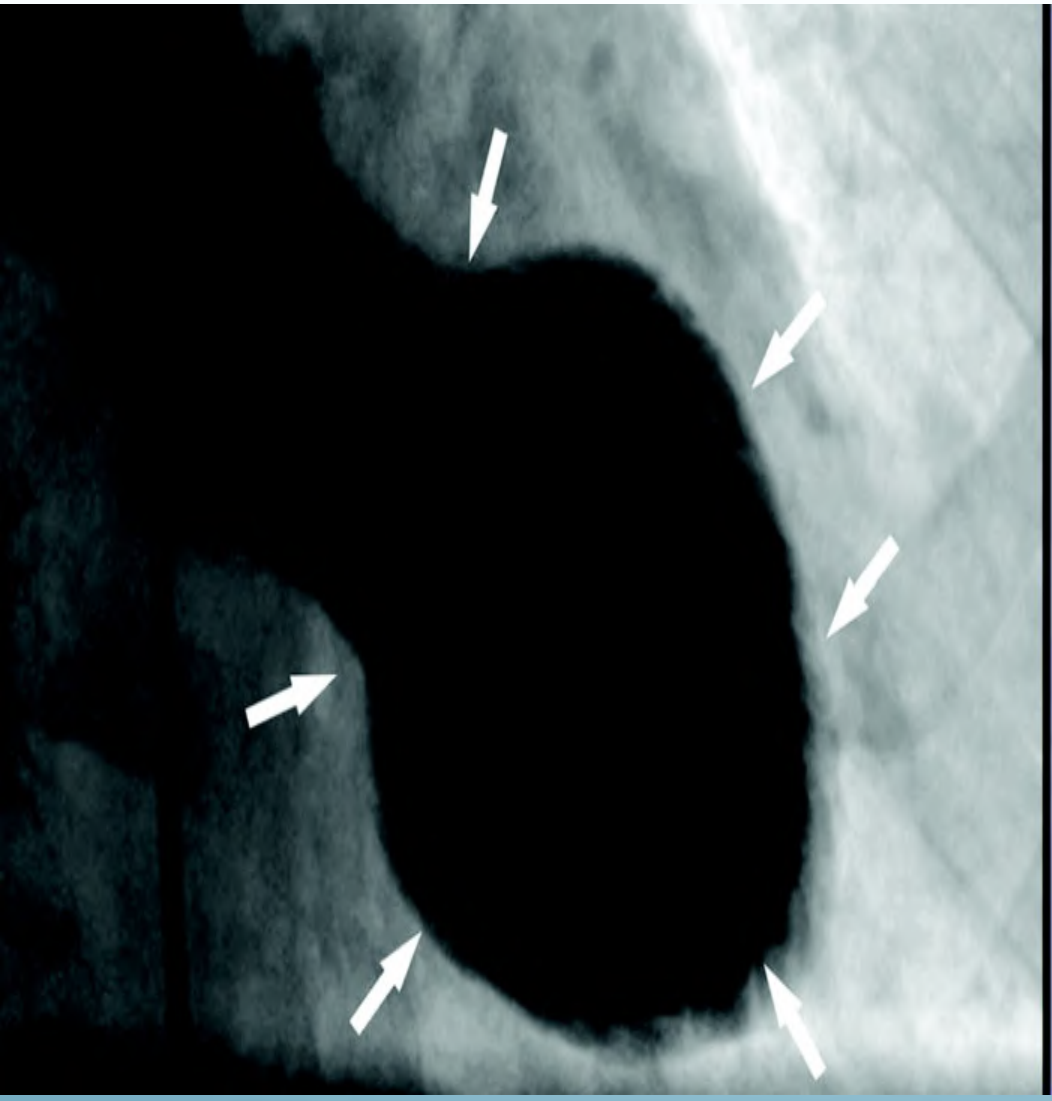
MECHANISM OF INCREASED CARDIAC RISK

- Increased sympathetic stimulation
  - Increased heart rate
  - Increased BP
  - Increased contractility
- Increase oxygen demand

STRESS-INDUCED CARDIOMYOPATHY

- Takotsubo- pot like octopus traps
- Transient cardiac syndrome precipitated by stressful event
- Akinesis of apex of left ventricle
- Mimics acute coronary syndrome
- Chest pain
- ST elevation
- Elevated cardiac enzymes

TAKOTSUBO



DIAGNOSTIC CRITERIA FOR TAKOTSUBO

- Transient hypokinesis of LV segments
  - Beyond a single arterial distribution
  - Often a stressful trigger
- Absence of aniographic evidence of plaque rupture
- New ECG abnormalities
- Elevation of troponin
- Absence of phaeochromocytoma or myocarditis

ETIOLOGY

- Stress induced catecholamine release
- Toxicity and stunning of myocardium
- Seen in rats and blunted by adrenergic blockade
- Other mechanisms
  - Multivessel spasm
  - Thrombosis,
  - Epicardial vessel occlusion
- Apical portions of the heart have the highest concentration of sympathetic innervation

INTERNATIONAL TAKOTSUBO REGISTRY

- Female 90%
- Physical triggers 36%
- Emotional triggers 27%
- No detectable triggers 29%
- Asian or caucasian

COMPLICATIONS AND PROGNOSIS

- COMPLICATIONS
  - Heart failure
  - Shock
  - Arrythmias
  - Free wall rupture
  - Death
- PROGNOSIS
  - 95% recovery in 4-8 weeks

STRESS AND ARRYTHMIAS

- Acute emotional stress can cause disturbances of rhythm
- Usually transient
  - Lateralization of brain activity
  - Asymmetric stimulation of the heart
  - Inhomogeneous repolarization
  - Electrical instability
  - Development of arrythmias

LIFESTYLE CHANGES

- Lack of exercise
- Overeating
- Smoking

STRESS AND SMOKING

- Most people acknowledge smoking is bad
- Many people use smoking as a means to deal with stress
- Nicotine is psychoactive drug that reduces
  - Frustration
  - Anxiety
  - Anger
- Effects are mediated by dopamine

STRESS AND SMOKING

- Smoking increases the risk of coronary artery disease
- The effects of nicotine
  - Increased BP
  - Vasoconstriction
  - Increased heart rate
  - Endothelial dysfunction
  - Increased risk of thrombosis
  - Oxidation of LDL

STRESS AND SMOKING

- Active smokers 80% increased risk
- Passive smokers 30% increase
- Increases risk of
  - Stable Angina
  - Acute coronary syndromes
  - Sudden death
  - Stroke
  - Peripheral arterial disease
  - Abdominal aortic aneurysms

ALCOHOL AND STRESS

- J-shaped curve with alcohol and mortality
- Hypertension
- Arrythmias
  - Holiday heart
- Alcoholic cardiomyopathy

CARDIOPROTECTIVE EFFECT OF ALCOHOL

- Increased HDL
- Decreased platelet function
- Increased lytic ability

STRESS AND HYPERTENSION

- Studies do not show that stress causes hypertension
- Can cause temporary elevations in BP
- Non-pharmacologic measures to treat stress also reduce BP
  - Meditation
  - Biofeedback
  - Music therapy
- With increased work hours, and connectivity
- Repeated BP elevations may eventually lead to hypertension
- If alcohol is used as a response to stress it may lead to increased BP

CONCLUSION

- Stress can potentially cause many cardiac issues
- Indirectly and directly
- The response to stress may modify risk