IMET 2000 PAL

International Medical Education Trust – Palestine

ACUTE CORONARY SYNDROMES

"ACS"

Raed Abu Sham'a, MD

Internist and cardiologist

Cardiac pacing and Electrophysiologist

Senior Medical Education Officer

ACUTE CORONARY SYNDROMES

LEARNING OBJECTIVES

- Define acute coronary syndromes (ACS)
- Understand the pathophysiology
- Be capable of risk stratification
- Aware of medications and strategies employed to manage ACS
- Use basic principles of ECG interpretation and infarct localization
- Apply knowledge to case studies

Raed Abu Sham'a, M.D

CASES

- 67 year old male
  - 8/10 chest pain with radiation
  - Nausea, diaphoresis, unwell
- 65 year old female
  - Chest pain off and on for 1 month worse recently
  - associated diaphoresis and nausea
- 37 year old male
  - Chest pain
  - No associated symptoms

ACUTE CORONARY SYNDROMES

DEFINITION

- *"constellation of symptoms manifesting as a result of acute myocardial ischemia"*

Pollack et.al. 41(3), 2003

Spectrum of disease:

– Unstable Angina (**UA**)

– Non ST Elevation MI (**NSTEMI**)

– ST Elevation MI (**STEMI**)

ACUTE CORONARY SYNDROMES

EPIDEMIOLOGY

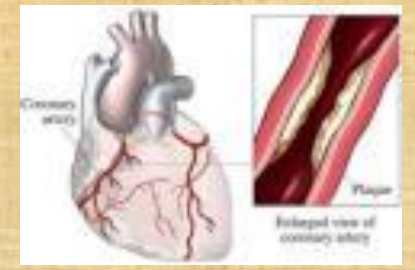
- Among leading cause of death and hospitalizations world wide
- Canada:
  - 80 000 AMI/year
  - 20 000 deaths

  - 140 000 UA hospitalized
  - death or nonfatal AMI within one year for 10 000 discharged
  - 500 000 ED visits for evaluation of chest pain and associated symptoms
  - >12% confirm myocardial injury

ACUTE CORONARY SYNDROMES

ETIOLOGY

- **Atherosclerotic plaque rupture** *
  - **inflammation**
  - **thrombosis**



- Vasospasm
- Dissection
- Decreased oxygen delivery *(e.g. anemia,hypotension)*
- Increased oxygen consumption *(e.g. sepsis, thyrotoxicosis)*

ACUTE CORONARY SYNDROMES

PATHOPHYSIOLOGY

- Atheromatous plaque
- Contained within coronary intima by thin cap
- Within the core, lipid laden "foam cells" produce the procoagulant, ***tissue factor*** (***TF***)
- Rupture occurs at the shoulder

ACUTE CORONARY SYNDROMES

PATHOPHYSIOLOGY

- ***TF*** + ***VIIa***, generates ***Xa*** = ***thrombin*** production
- Platelets are activated by exposure to:
  - ***collagen***, ***von Willebrand factor***, ***thrombin***
- Further activation and induction of vasospasm with:
  - **adenosine diphosphate**, **thromboxane A2** and **prostacyclins**
- Activated platelets cross link ***fibrinogen***

- RESULT: ***occlusive thrombus***

ACUTE CORONARY SYNDROMES

CLINICAL FEATURES

- **History:**
- symptom onset, duration, exacerbators, palliators
- cocaine use
- **Physical Examination:**
  - ***vital signs***
  - ***inspection***
    - distress, work of breathing, pulsations
  - ***palpation***
    - edema, peripheral pulses, thrill/bruits, PMI, JVP
  - ***auscultation***
    - heart sounds, murmurs, bruits
    - pulmonary adventitia

ACUTE CORONARY SYNDROMES

CLINICAL FEATURES

- **ACS associated symptoms:**
  - Diaphoresis *
  - Nausea and vomiting
  - Dyspnea
  - Lightheadedness/Syncope
  - Palpitations

ACUTE CORONARY SYNDROMES

Stable Angina

- Does not predict acute events
- Marker of established coronary artery disease (CAD)
  - Fixed lesion / partially occluded vessel
  - Mismatch in oxygen supply and demand
- Precipitants:
  - *Exercise*
  - *Cold*
  - *Stress*
- Duration:
  - *</= 15 to 20 minutes*
- Relief:
  - *Rest*
  - *Nitroglycerine*

ACUTE CORONARY SYNDROMES

CLINICAL FEATURES

Anginal Equivalents:

angina = visceral sensation that is poorly defined and localized

- ***Diaphoresis***
- ***Dyspnea***
- ***Discomfort in areas of radiation*** *(jaw, shoulder,arm)*
- ***GI complaints*** *(inferior AMI)*
- ***Dizziness, weakness, presyncope***

- **Atypical Presentations:**
  - Up to 30%
  - Female, Elderly, Diabetic patients

ACUTE CORONARY SYNDROMES

Unstable Angina

- **Clinical Presentation:**
- I. **New Onset Angina**
  - *Within past 1-2 months*
  - *CCS III or IV*
- II. **Crescendo Angina**
  - *Previous stable angina which has become more frequent, severe, prolonged, easily induced or less responsive to nitroglycerine*
- III. **Rest Angina**
  - *Angina occurring at rest and lasting more than 15-20 minutes*

CANADIAN CARDIOVASCULA SOCIETY(CCS)

CLASSIFICATION FOR ANGINA

Can J Cardiol 1996; 12: 1279-92

- **Class I:**
  - *Ordinary physical activity*
- **Class II:**
  - *Slight limitation of ordinary physical activity*
  - *Angina occurs with walking > 2 blocks, climbing stairs, emotional stress*
- **Class III:**
  - *Severe limitation of ordinary physical activity*
  - *Angina occurs with walking < 1-2 blocks or climbing <1 flight of stairs in normal conditions*
- **Class IV:**
  - *Inability to carry out physical activity without discomfort: angina may be present at rest*

ACUTE CORONARY SYNDROMES

Unstable Angina/NSTEMI

- UA/NSTEMI
  - Patent culprit artery, ulcerated plaque and associated thrombus
  - Significant risk of of thrombotic reocclusion

- Unstable Angina = ACS ***without*** abnormal levels of serum biomarkers for myocardial necrosis *(Ti,Tt,CK-MB)*

- NSTEMI = ACS ***with*** positive markers

ACUTE CORONARY SYNDROMES

NSTEMI

- **Heterogeneous population**
  - Atypical presentation
  - Variable age
  - Medical burden
    - renal insufficiency
  - Perceived difficulty with interpreting biomarkers

INTERPRETATION OF TROPONINS

Troponin I

- High sensitivity and specificity
- Appears within **6 hours** of injury
- Requires up to **14 days** for clearance
    - *Not useful with reinfarction*

- Spectrum
    - *Higher the troponin, the greater the risk*

- False positive:
  - CHF, pericarditis, myocarditis, contusion, cardiomyopathy
  - Shock
  - Renal insufficiency
  - Pulmonary emboli

ACUTE CORONARY SYNDROMES

STEMI

- **STEMI**
  - Complete thrombotic occlusion of a major epicardial artery

- Presentation:
  - Characteristic symptoms of cardiac ischemia
    - *More prolonged and severe symptoms*
    - *Little response to nitroglycerine*
  - Specific EKG changes on serial EKGs
  - Elevation of serum markers for cardiac injury

WHO definition of AMI

THE ELECTROCARDIOGRAM

- 12 lead EKG
  - ***Cornerstone of initial evaluation***
  - ***Within 10 minutes of presentation***
- Previous EKG tracings
  - ***Compare***
- Serial EKGs
  - ***Essential***

THE ELECTROCARDIOGRAM

INFARCT LOCATION

- **II, III, AVF** : Inferior
- **V1 - V4** : Anteroseptal
- **I, aVL, V5-V6** : Lateral
- **V1-V2 tall R, ST depression** : True posterior

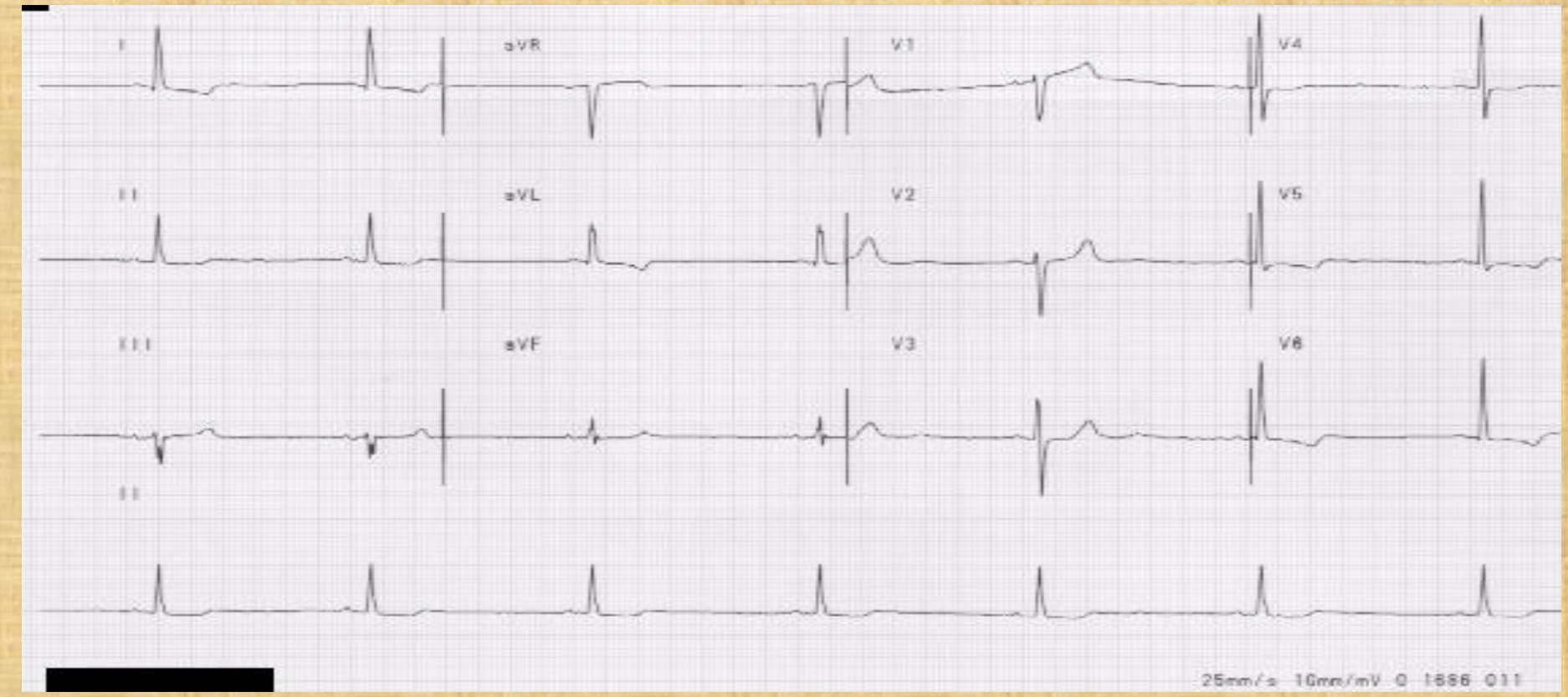
ACUTE CORONARY SYNDROMES

ELECTROCARDIOGRAPHY

- Ischemia:
  - Mismatch between perfusion and oxygen demand
  - Goal:
    - ***Reduce oxygen demands*** and/or ***Increase perfusion***
- EKG Changes:
  - ST and T wave changes
    - ST segment depression
    - T waves
      - flattened, inverted, tall and peaked, symmetrical

ELECTROCARDIOGRAM

ISCHEMIA



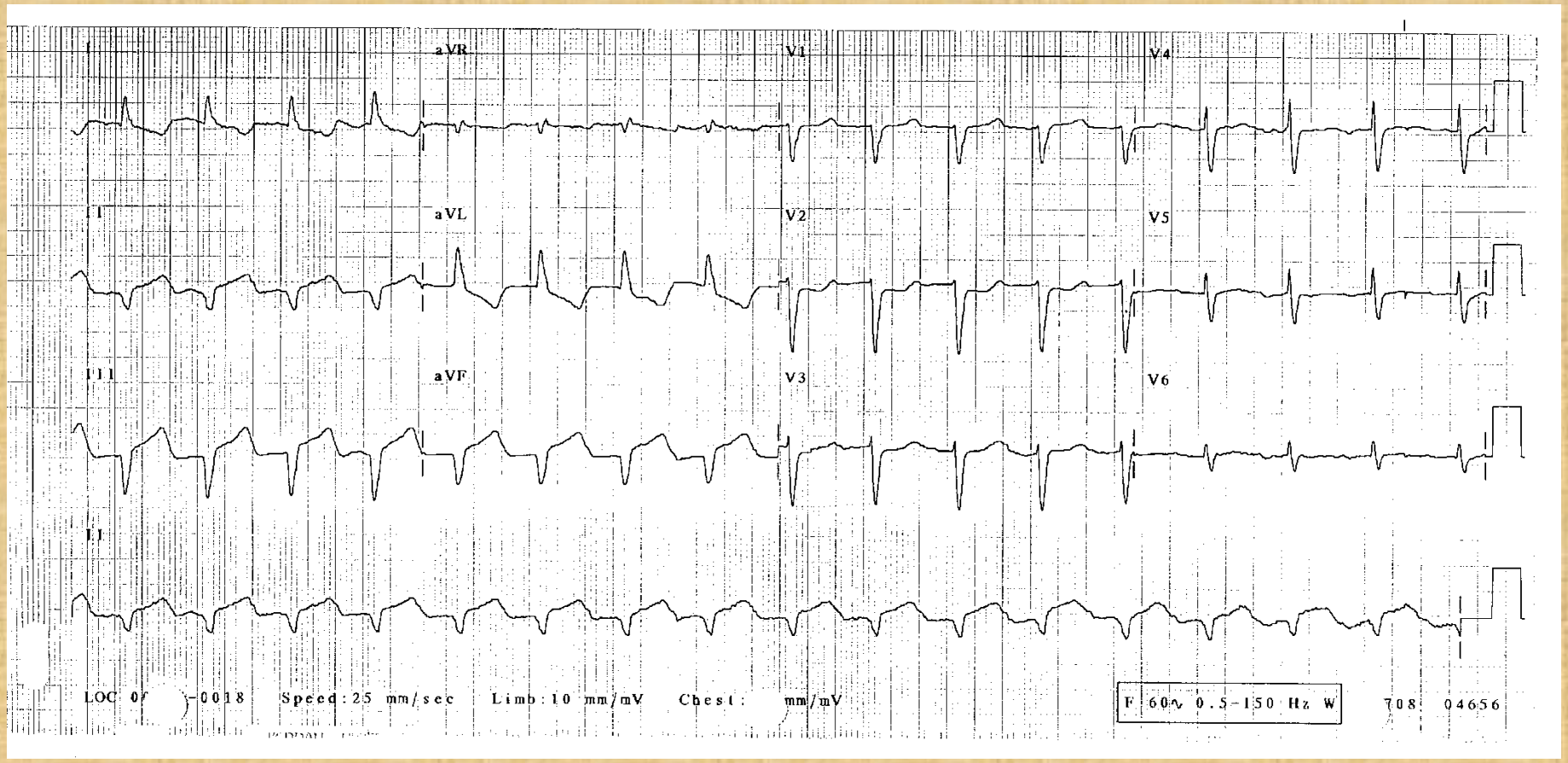
ACUTE CORONARY SYNDROMES

ELECTROCARDIOGRAPHY

- Injury:
  - Prolonged ischemia (minutes)
  - Can “salvage” with reperfusion
- EKG changes:
  - ST segment elevation
    - > 1 mm in 2 or more anatomically contiguous leads
  - New left bundle branch block (LBBB)
  - True posterior change

ELECTROCARDIOGRAM

INJURY



ACUTE CORONARY SYNDROMES

ELECTROCARDIOGRAPHY

- Infarction:
  - Myocardial cell necrosis
    - *Leaking of intracellular components*
- EKG Changes:
  - Abnormal Q waves
    - >2 hours after symptoms
    - > 1 mm wide
    - Height > 25% R wave

ELECTROCARDIOGRAM

INFARCTION

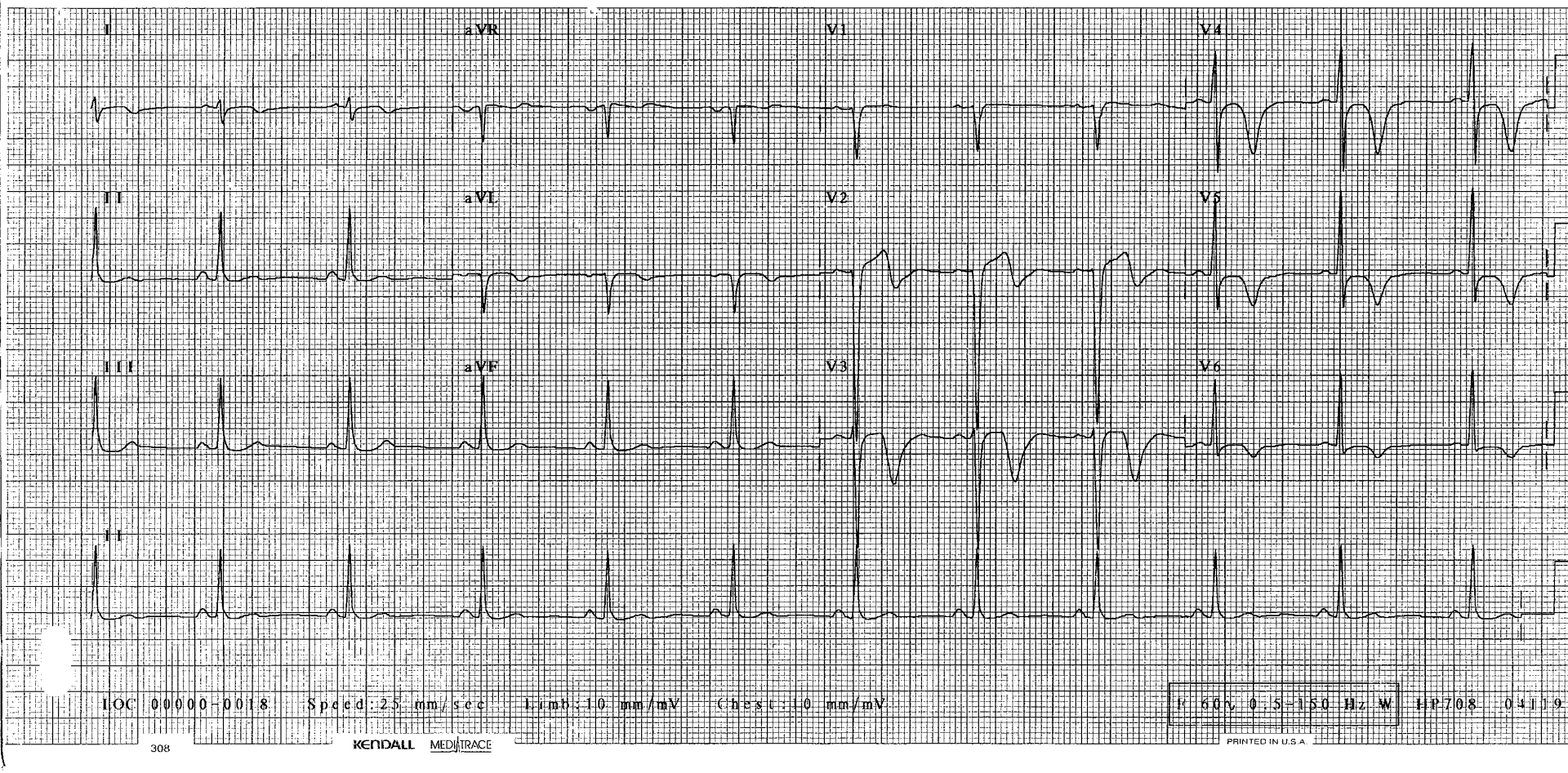
THE ELECTROCARDIOGRAM

WELLEN'S SYNDROME

- **Clinical UA with:**
  - ***Inverted*** or ***biphasic*** **T**-waves in **V2** and **V3**
  - T wave changes may also be present in V1, V4-V6
  - Changes appear when ***pain free***
  - Little to **no** ST change
  - **No** loss of precordial R waves
  - **No** pathologic Q waves
- **Concern:**
  - Highly specific for LAD lesions
  - At risk for extensive AMI or sudden death

THE ELECTROCARDIOGRAM

WELLEN'S SYNDROME



CARDIAC RISK FACTORS

TRADITIONAL

- ***NOT PREDICTIVE ACUTE ISCHEMIA***
  - AGE
  - FAMILY HISTORY
  - HYPERTENSION
  - DYSLIPIDEMIA
  - DIABETES MELLITUS
  - SMOKING HISTORY

TIMI RISK SCORES

- **T**hrombolysis **I**n **M**yocardial **I**nfarction

- Clinical risk algorithms
  - Risk stratification in ACS
- Retrospectively derived/ Prospectively validated

TIMI RISK SCORE FOR UA/NSTEMI

HISTORICAL	POINTS
age >/= 65 y	1
>/= 3 CAD risk factors	1
known CAD (stenosis >/= 50%)	1
ASA use in past 7 days	1
PRESENTATION	
severe angina </= 24 hours	1
elevated cardiac markers	1
ST deviation >/= 0.5 mm	1

RISK SCORE: /7

TIMI RISK SCORE FOR UA/NSTEMI

RISK OF CARDIAC EVENT IN 14 DAYS

RISK SCORE	0-1	2	3	4	5	6-7
DEATH OR AMI (%)	3	3	5	7	12	19
DEATH, AMI OR PTCA/ CABG (%)	5	8	13	20	26	41

Antman et.al. JAMA 2000; 284: 835-42

TIMI RISK SCORE FOR STEMI

HISTORICAL	POINTS
age >/= 75 y or 65-74 y	3 or 2
DM, HTN, Angina	1
EXAM	
SBP < 100 mmHg	3
HR > 100	2
Killip Score II-IV	2
weight < 67 kg (150lbs)	1
PRESENTATION	
anterior ST elevation or LBBB	1
time to Rx > 4 hours	1

RISK SCORE: /14

KILLIP SCORE

SEVERITY CLASS	LV FUNCTION IN AMI
I	No crackles, no S3
IIa	Crackles < 50 % lung fields, no S3
IIb	Crackles < 50 % lung fields, S3 present
III	Crackles > 50 % lung fields, pulmonary edema
IV	Cardiogenic Shock

TIMI RISK SCORE FOR STEMI

30 DAY MORTALITY (%)

RISK SCORE	0	1	2	3	4	5	6	7	8	>8
30 DAY MORTALITY	0.8	1.6	2.2	4.4	7.3	12	16	23	27	36

Morrow et.al Circulation; 102:2031-7

AGENTS USED IN ACUTE CORONARY SYNDROMES

- **WHY**
- **WHEN**
- **HOW**
- **PRECAUTIONS**

THE EVIDENCE

Level of Evidence	***Grading***
A	Well designed, randomized, controlled trials OR meta-analyses involving large number of patients
B	Smaller radomized trials OR reviews of observational, retrospective or nonrandomized trials
C	Expert consensus, primary nonrandomized OR observational data

THE EVIDENCE

Class I	Evidence or general agreement that a specific procedure or treatmetn is useful and effective
Class II	Conflicting evidence or divergence of opinion about the utility or efficacy of a procedure or treatment
II a	Weight of evidence or opinion is in favour of utility-efficacy
II b	Utility-efficacy is less well established by evidence or opinion
Class III	Evidence or general agreement that a specific procedure or treatment is neither useful n effective and may be harmful

AGENTS USED IN ACUTE CORONAY SYNDROMES

OXYGEN

Level C evidence

- **WHY**
  - Increase supply to ischemic tissue
- **WHEN**
  - Suspect ACS
- **HOW**
  - Start with nasal cannula at 4L/min
- **PRECAUTIONS**
  - COPD

AGENTS USED IN ACUTE CORONAY SYNDROMES

ASPIRIN

Class I, Level A evidence

- **WHY**
  - Mortality reduction
  - Blocks synthesis of ***thromboxane A2***
    - Inhibits platelet aggregation
    - Relaxes arterial tone
- **WHEN**
  - Suspected ACS
- **HOW**
  - 160 mg chewed slowly, then 81-325 mg daily or pr
- **CONTRAINDICATION**
  - True allergy
  - No GI tract !

AGENTS USED IN ACUTE CORONAY SYNDROMES

UNFRACTIONATED HEPARIN

- **WHY**

  Class I, Level A evidence + ASA

  - Inhibits thrombin > IXa, Xa
  - Prevent thrombus formation over ruptured plaque
  - Prevent recurrence of thrombosis
  - Prevent mural thrombus
- **WHEN**
  - UA/NSTEMI
  - With tPA
  - With PTCA/surgical revascularization
- **HOW**
  - IV bolus *(60 units/kg iv to maximum 5000 units)*, then
  - Infusion *(1000 units/hr)*

AGENTS USED IN ACUTE CORONAY SYNDROMES

UNFRACTIONATED HEPARIN

- **PRECAUTIONS**
  - Active bleeding
  - Recent intracranial, intraspinal, eye surgery
  - Severe hypertension
  - Bleeding disorders

AGENTS USED IN ACUTE CORONAY SYNDROMES

LOW MOLECULAR WEIGHT HEPARIN

E.g. Enoxaparin (Lovenox), Dalteparin

Class I, Level A evidence + ASA

- **WHY**
  - Antithrombotic, anti Xa
  - Predictable
  - Do not require coagulation test monitoring
  - Lower incidence of thrombocytopenia
  - No platelet activation
  - Binds clot bound thrombin
- **WHEN**
  - Suspected ACS

AGENTS USED IN ACUTE CORONAY SYNDROMES

LOW MOLECULAR WEIGHT HEPARIN

- **HOW**
  - Subcutaneously
- **PRECAUTIONS**
  - Renal insufficiency
  - Weight > 150 kg

AGENTS USED IN ACUTE CORONAY SYNDROMES

BETA-BLOCKERS (Bb)

E.g. Metoprolol, Bisoprolol, Atenolol, etc.

Level A evidence

- **WHY**
  - Anti-arrhythmic
  - Anti-ischemic
  - Anti-hypertensive
  - Decreased myocardial rupture at one week in STEMI
- **WHEN**
  - Within 12 hours of AMI
  - ACS and excess sympathetic activity
- **HOW**
  - Intravenous *(Metoprolol)*
  - Oral

AGENTS USED IN ACUTE CORONAY SYNDROMES

BETA-BLOCKERS (Bb)

- **CONTRAINDICATIONS**
- **ABSOLUTE:**
  - Shock
  - Bradycardia
  - Hypotension
  - Severe asthma
  - Acute CHF/pulmonary edema
- **RELATIVE:**
  - Asthma / severe COPD
  - Heart blocks
  - Severe PVD
  - IDDM
  - Extreme age

AGENTS USED IN ACUTE CORONAY SYNDROMES

ADP ACTIVATION INHIBITORS

Class I, Level A evidence, ***if cannot take ASA***
Class I, Level B evidence, ***otherwise***

E.g. Clopidogrel (Plavix), Ticlodipine

- **WHY**
  - Irreversible inhibitor of ADP-receptor mediated platelet aggregation
- **WHEN**
  - STEMI, ASA sensitivity
  - UA/NSTEMI
  - High risk patient characteristics

AGENTS USED IN ACUTE CORONAY SYNDROMES

CLOPIDOGREL (Plavix)

- **HOW**
  - 300mg po load, then 75 mg po qd
- **PRECAUTIONS**
  - Allergy
  - Thrombocytopenia
  - High risk GI bleed
  - (CV surgical procedure anticipated)
    - *Stop minimum 5 days prior*

AGENTS USED IN ACUTE CORONAY SYNDROMES

GPIIb/IIIa INHIBITORS

Class I Level A evidence
in patients with planned PCI in 12-24 hours, ASA and heparin
Class IIa, Level A evidence
In high risk patients without planned PCI, ASA and heparin

E.g. Eptifibatide (Integrelin), Abciximab Tirofiban

- **WHY**
- Competitive inhibition of fibrinogen binding between platelets
- **WHEN**
  - ACS, refractory symptoms
  - Urgent PCI
  - With ASA and UFH +/- PCI
- **HOW**
  - Bolus: 180 mcg/kg iv *(maximum weight 120kg)*
  - Infusion: 2 mcg/kg/min *(**half** with renal insufficiency)*

AGENTS USED IN ACUTE CORONAY SYNDROMES

EPTIFIBATIDE (Integrelin)

- No established role with thrombolysis or LMWH
- **PRECAUTIONS**
  - Active bleeding within 30 days
  - Stroke or head injury within 30 days
  - Bleeding diathesis
  - INR >2.0
  - Platelets < 100,000
  - Major surgery or trauma within 6 weeks
  - Uncontrolled HTN (SBP > 200, DBP >110)
  - Hypersensitivity

AGENTS USED IN ACUTE CORONAY SYNDROMES

NITROGLYCERINE

- Does not reduce mortality

Level C evidence

- **WHY**
  - Decreases ischemic pain
    - *Venodilation/ decreased preload*
    - *Dilates coronary arteries (eliminates vasospasm)*
    - *Increases coronary collateral flow*
- **WHEN**
  - Ischemic chest pain
  - For 24-48 hr after AMI
    - *Recurrent pain*
    - *Hypertension*
    - *CHF*

AGENTS USED IN ACUTE CORONAY SYNDROMES

NITROGLYCERINE

- **HOW**
  - Sublingual
    - Tablets: 0.3mg q 5 minutes
    - Spray: 0.4 mg q 5 minutes
  - IV Infusion
    - Start 10-20 mcg/min
    - Increase by 5-10 mcg/min q5-10 minutes
- **PRECAUTIONS**
  - Avoid hypotension
  - **Extreme caution** with **RV infarction**
  - Interaction with sildenafil (Viagra)

AGENTS USED IN ACUTE CORONAY SYNDROMES

MORPHINE

- **WHY**

Level C evidence

  - Reduce ischemic pain
  - Reduce anxiety
  - Reduce extension
    - *Reduction of sympathetic tone and oxygen demands*

- **WHEN**
  - Ongoing pain of infarction
  - Acute pulmonary edema
  - SBP > 90 mmHg

AGENTS USED IN ACUTE CORONAY SYNDROMES

MORPHINE

- **HOW**
  - Small increments IV
    - *1 - 3 mg prn, to eliminate pain*
- **PRECAUTIONS**
  - Allergy
  - Nausea and vomiting
  - Hypotension
  - Respiratory depression

AGENTS USED IN ACUTE CORONAY SYNDROMES

ACE-INHIBITORS

E.g. *Ramipril, Enalapril, Captopril*

Level A evidence

(Anterior infarct, EF< 40%)

- **WHY**
  - Reduce
    - Left ventricular dysfunction and dilation
  - Remodeling
  - Decrease afterload and preload
  - Reduction in mortality
- **WHEN**
  - Within 24 hours AMI
  - Suspected or known CAD

AGENTS USED IN ACUTE CORONAY SYNDROMES

ACE-INHIBITORS

- **HOW**
  - Oral
- **PRECAUTIONS**
  - Pregnancy
  - Symptomatic hypotension
  - Bilateral renal artery stenosis
  - Angioedema
  - Allergy

MANAGEMENT NSTEMI ACS

Very High Risk *(>15% 30 day AMI/Mortality)*

- **PRESENTATION**
- Prolonged/recurrent pain
- >2mm ST depression
- Positive cardiac markers
- >1mm transient ST elevation
- Hemodynamic instability
- Refractory ischemia

- **TREATMENT**
- ASA
- Clopidogrel
- Heparin
- Eptifibatide
- Urgent coronary angiography
- Urgent revascularization

Can. J Cardiol. 18(11), 2002

MANAGEMENT NSTEMI ACS

High Risk *(8-15% 30 day AMI/Mortality)*

- **PRESENTATION**
- Rest pain> 20 minutes
- >2mm ST depression
- Deep T wave inversion (>5mm)
- >2mm T wave inversion in >5 leads
- Positive cardiac markers

- **TREATMENT**
- ASA
- Clopidogrel
- Heparin
- +/- Eptifibatide *(in consultation with cardiology)*
- Early coronary angiography

Can. J Cardiol. 18(11), 2002

MANAGEMENT NSTEMI ACS

Intermediate Risk *(3-8% 30 day AMI/Mortality)*

- **PRESENTATION**
  - Rest pain
  - New onset or crescendo pain
  - Nonspecific or normal EKG
  - Normal or borderline positive cardiac markers
  - Increased baseline risk (DM, previous AMI,CABG, recent PCI)

- **TREATMENT**
  - ASA
  - +/-Clopidogrel
  - Heparin
  - EST or myocardial perfusion scan
  - Coronary angiography

Can. J Cardiol. 18(11), 2002

MANAGEMENT NSTEMI ACS

Low Risk *(<3% 30 day AMI/Mortality)*

- **PRESENTATION**

- Single short duration pain
- New onset or crescendo pain
- Nonspecific/normal EKG X 2
- Normal cardiac markers X 2
- No high risk features

- **TREATMENT**

- ASA
- EST within 48 hours

Can. J Cardiol. 18(11), 2002

ACUTE CORONAY SYNDROMES

PERCUTANEOUS TRANSLUMUNAL ANGIOPLASTY

Level A evidence

- *"early angiography and directed revascularization (within 7 days), when combined with optimal medical pretreatment, is the preferred strategy for patients with and ACS who present with signs of ischemia on EKG or raised biochemical markers at admission"*

FRISC II

MANAGEMENT STEMI ACS

- **Urgent reperfusion:**
  - **F**IBRINOLYSIS
  - **P**ERCUTANEOUS **C**ORONARY **I**NTERVENTION

AGENTS USED IN ACUTE CORONAY SYNDROMES

FIBRINOLYTICS

- **WHY**

Level A evidence

  - Plasminogen activators
  - Degrade the occlusive thrombus
- **WHEN**
  - **WITHIN 30 MINUTES OF PRESENTATION**
  - Ischemic type chest pain
  - EKG compatible
    - *ST elevation > 2mm in 2+ contiguous leads*
    - *new LBBB*
    - *true posterior infarct*
  - Pain </= 6 hours *(< 12 hours)*
  - No contraindications

CONTRAINDICATIONS TO THROMBOLYSIS

- **CONTRAINDICATIONS**
- **ABSOLUTE:**
  - *Lack of clear indications*
  - *Active internal bleeding*
  - *Recent trauma, major surgery, internal bleeding (within 2weeks)*
  - *Suspected aortic dissection*
  - *Pericarditis*
  - *Previous hemorrhagic stroke*
  - *Other strokes within one year*
  - *Known intracranial neoplasm*

CONTRAINDICATIONS TO THROMBOLYSIS

- **RELATIVE:**
  - *Recent trauma, major surgery, internal bleeding (2-4 weeks)*
  - *Severe uncontrolled hypertension (> 180/ 110 mmHg)*
  - *Current use of anticoagulants (INR > 2-3)*
  - *Intracerebral pathology (other than stroke)*
  - *Known bleeding diathesis*
  - *Active peptic ulcer disease*
  - *Pregnancy*
  - *Noncompressible vascular punctures*
  - *Known hypersensitivity to agent*
  - *Age > 75 years*
  - *Prolonged (> 10 minutes) traumatic CPR*

AGENTS USED IN ACUTE CORONAY SYNDROMES

FIBRINOLYTICS

- **HOW**
  - ***Streptokinase***
    - » Derived from beta-hemolytic Streptococcus cultures
    - » Smaller infarcts, elderly, underweight
    - » 1.5 million units over 1 hour
  - ***Tissue Plasminogen Activator tPA***
    - » Naturally occurring enzyme
    - » Better with large infarct
    - » Highest incidence of ICH
    - » 15 mg IV bolus
    - » 0.75 mg/kg over next 30 min (50 mg)
    - » 0.50 mg/kg over next 60 min (35 mg)

AGENTS USED IN ACUTE CORONAY SYNDROMES

FIBRINOLYTICS

- ***Tenecteplase (TNK)***
  - Single bolus
  - Weight based dosing
- ***Reteplase***
  - Genetically modified t-PA
  - Not weight based
  - Two boluses of 10 units, 30 minutes apart

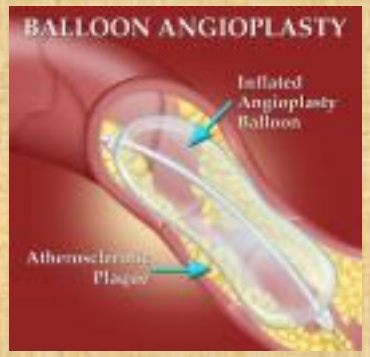
ACUTE CORONAY SYNDROMES

PERCUTANEOUS TRANSLUMUNAL ANGIOPLASTY

- **Emergent PTCA:**

Level A/B evidence

  - *Consider:*
    - Ongoing symptoms of >12 hour duration
    - Contraindications to thrombolysis
    - Failure of thrombolytics
    - Cardiogenic shock and AMI
    - Previous CABG
    - "Stuttering Infarction"
    - Access to lab



ACUTE CORONARY SYNDROMES

PUTTING IT ALL TOGETHER

IMET 2000 PAL
International Medical Education Trust – Palestine
www.imet2000-pal.org
Raed Abu Sham'a, M.D

CASE ONE

- *Frail 67* year old *hypertensive* male
- 8/10 substernal chest pain
- Radiation down left arm, into jaw
- Diaphoresis, tachypnea, nausea
- Onset within past *four hours*
- No relief with nitro
- **T** 37.1 C **HR** *112*/min **BP** 150/100 **RR** 22/min

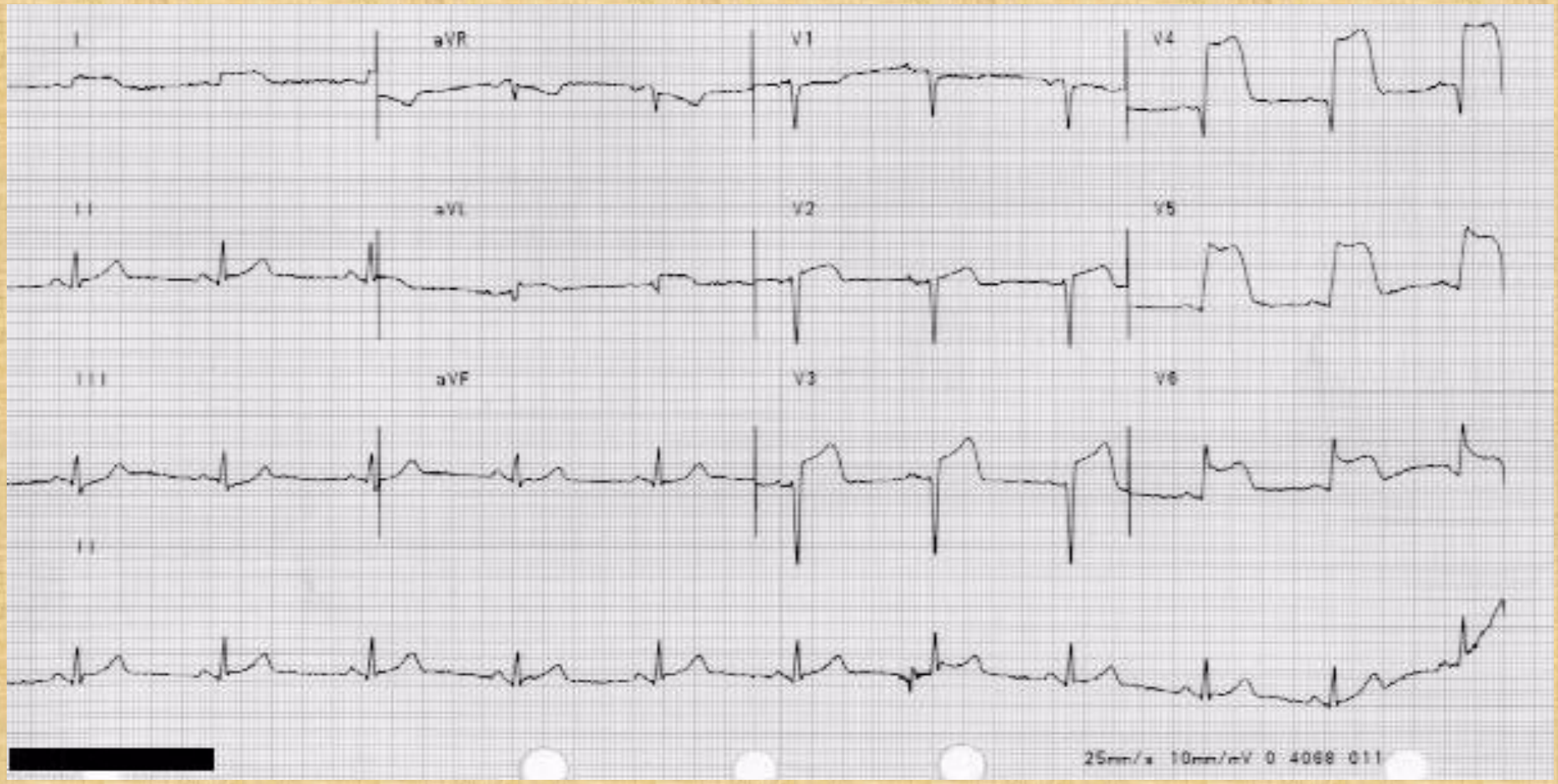
CASE ONE

Immediate Assessment:

- IV access – Oxygen – Monitors
- EKG
- Targeted history and exam
- CXR
- Eligibility for thrombolysis/PCI
- Labs

CASE ONE

ELECTROCARDIOGRAM



CASE ONE

- **Risk stratify:**
  - STEMI, TIMI score >8 (VERY HIGH RISK)
- **Immediate Treatment:**
  - ASA 160 mg po
  - Oxygen
  - +/- nitro sl
  - Metoprolol
  - Heparin
  - Emergent revascularization strategy

CASE ONE

- **Adjunctive Treatment:**
  - Clopidogrel po
  - Nitroglycerine iv
  - Morphine iv
  - Consider IIb/IIIa agents if primary PCI

CASE TWO

- *65 year old diabetic* female
- Retrosternal/epigastric pressure with no radiation
- Occurs at rest, duration </= 15minutes
- Associated with nausea and diaphoresis
- Pain free currently
- Onset 1/12 ago but increasing 4/7

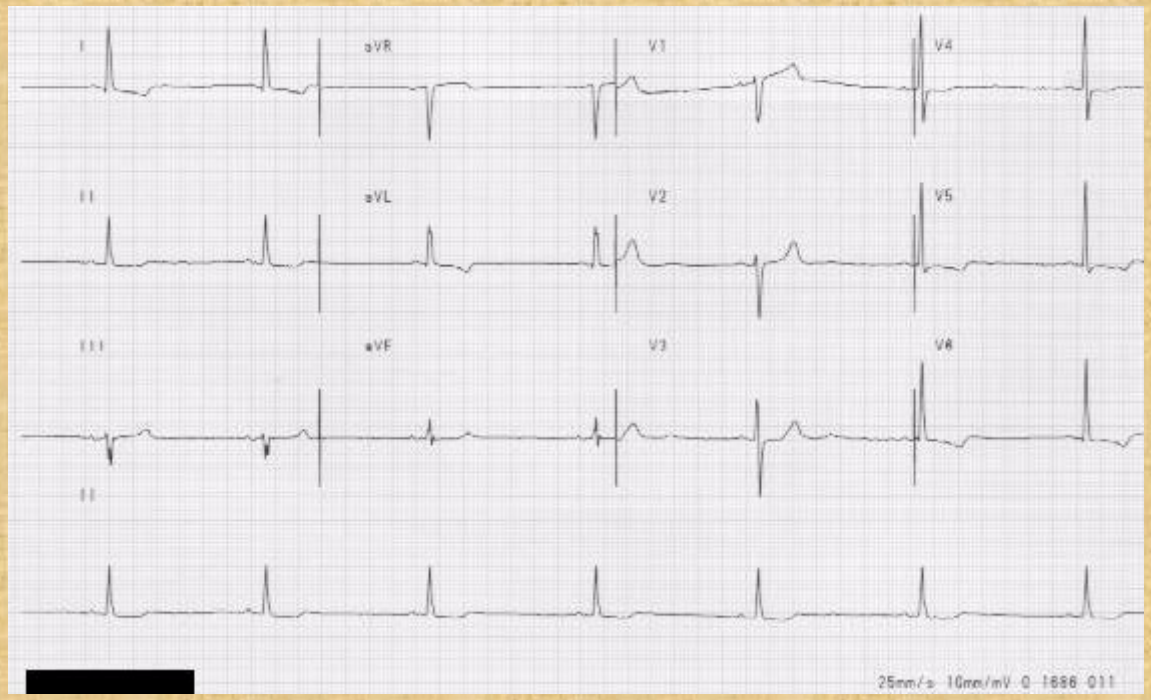
CASE TWO

Immediate Assessment:

- IV access – Oxygen – Monitors
- EKG
- Targeted history and exam
  - *smoker, dyslipidemic, hypertension, proteinuria*
  - *on ASA, HCTZ, metformin, glyburide, celexa*
  - *normal cardiac exam*
- CXR
- Labs

CASE TWO

ELECTROCARDIOGRAM



CASE TWO

- **Risk stratify:**
  - UA/NSTEMI, TIMI score >4 (INTERMEDIATE RISK)
- **Immediate Treatment:**
  - ASA 160 mg po
  - Heparin (LMWH > UFH)
  - +/- Clopidogrel
  - Coronary angiogram

CASE TWO

- **Adjunctive Treatment:**
  - Beta Blockers
  - ACE Inhibitors
  - +/- Nitrates

CASE THREE

- 37 year old male complains of a retrosternal dull ache for 3 hours
- No radiation of pain
- No associated symptoms
- Smoker, significant family history

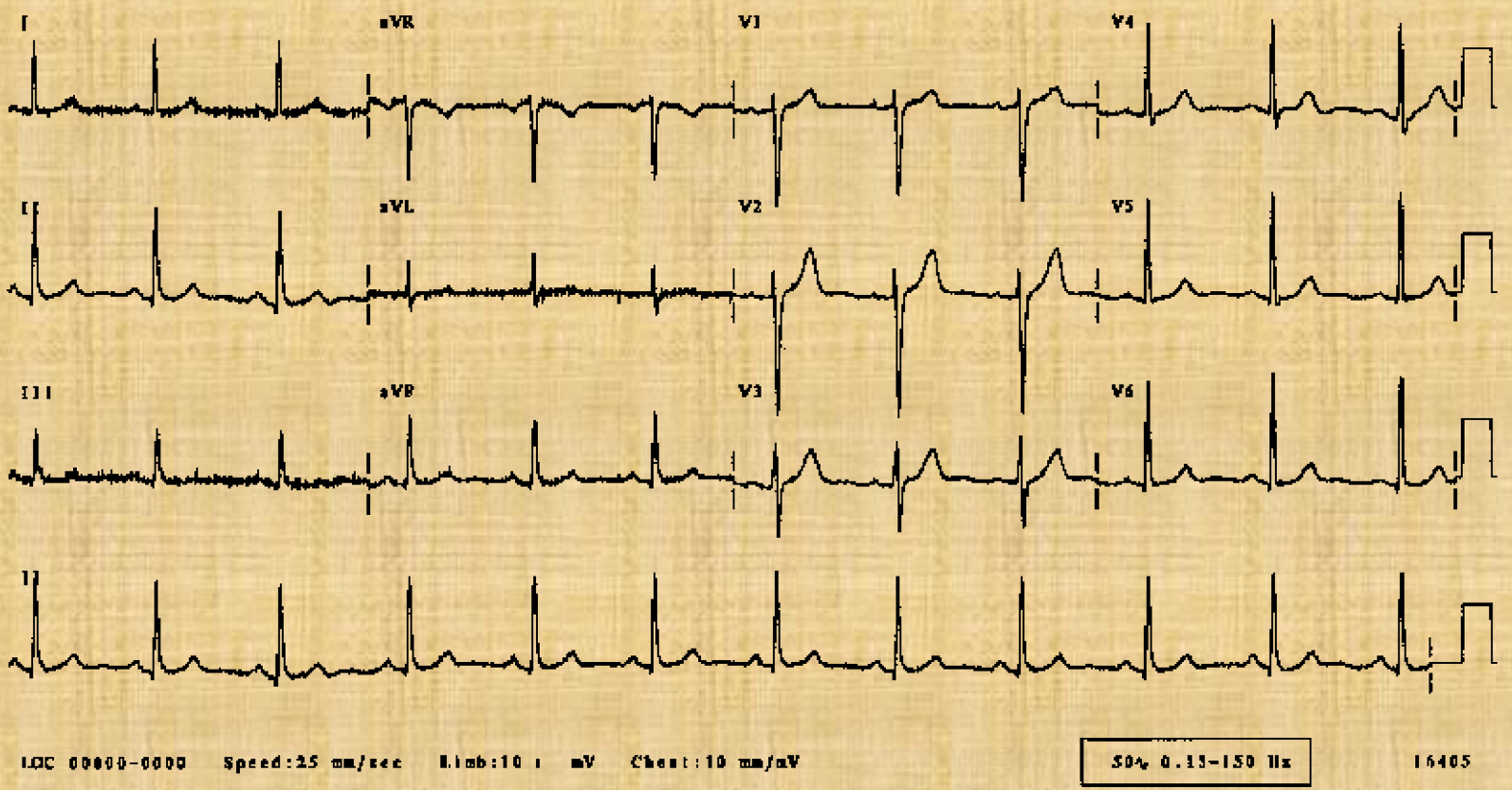
CASE THREE

Immediate Assessment:

- IV access – Oxygen – Monitors
- EKG
- Targeted history and exam
- CXR
- Labs

CASE THREE

ELECTROCARDIOGRAM



CASE THREE

- **Risk stratify:**
  - UA/NSTEMI, TIMI score 1 (LOW RISK)
- **Immediate Treatment:**
  - ASA 160 mg po
  - Monitor
  - Serial EKG *and* enzymes (X2)
  - Exercise Stress Test

SUMMARY

- **Suspected Ischemic Chest Pain Needs:**
  - Urgent +/- serial EKGs
  - Monitoring
  - Cardiac Biomarkers
  - Targeted History and Physical Examination to:
    - Define ACS
    - Risk stratify (e.g. TIMI Scores)
  - Appropriate management
    - Antiplatelet, antithrombotic, anti-ischemic, +/- revascularization

SUMMARY

- STEMI
  - complete thrombotic occlusion of a major epicardial artery
  - GOAL = establish patency and preserve myocardial function
- UA/NSTEMI
  - partially occluded culprit artery, or fully occluded with collaterals
  - ulcerated plaque and associated thrombus
  - significant risk of of thrombotic reocclusion
  - THERAPY = antithrombotic and antiplatelet

SUMMARY

THE ELECTROCARDIOGRAM

1. ST segment elevation 2mm *(2 contiguous leads)*, new LBBB, true posterior ischemia

STEMI

EMERGENT REPERFUSION

2. ST depression >1mm, marked symmetrical T wave inversions >2 mm or Wellen's pattern, dynamic ST-T changes with pain

UA/NSTEMI LIKELY

MEDICAL MANAGEMENT +/- URGENT IMAGING

3. Non-diagnostic or normal ECG

ACS LESS LIKELY

RISK STRATIFY

SUMMARY

- Goal of ACS Management:
  - *REDUCE PATIENT SYMPTOMS*
  - *REDUCE MORTALITY*
  - *LIMIT MYOCARDIAL DAMAGE*
  - *PRESERVE **LV** FUNCTION*

“ TIME IS MUSCLE ”

Thank You for Your Attention

IMET 2000 PAL
International Medical Education Trust – Palestine
www.imet2000-pal.org
Raed Abu Sham'a, M.D