2017
Acute Coronary Syndrome

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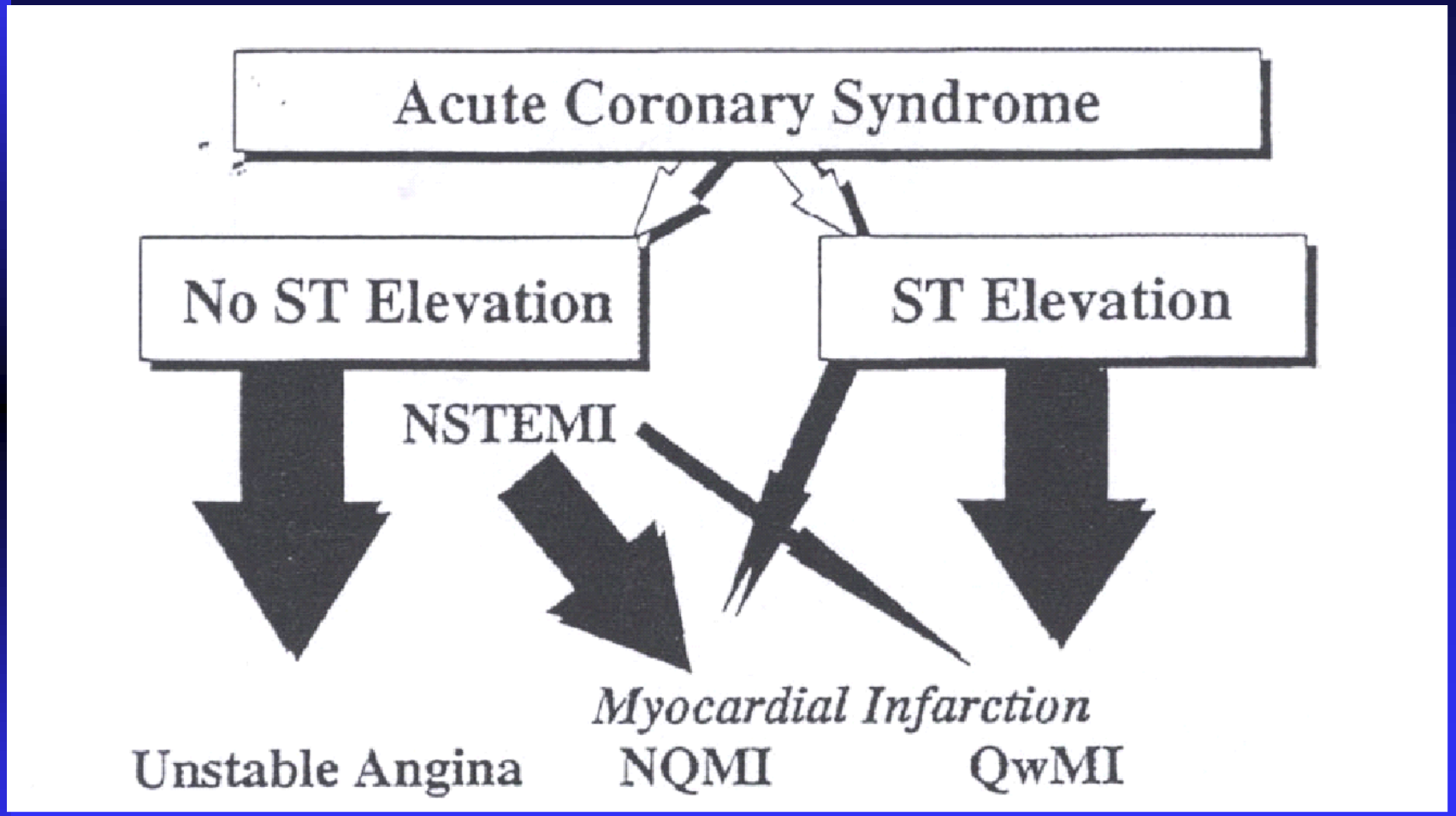
Disclosures: Previous speaker for Brilinta

ACS

Definitions: Acute Myocardial Ischemia

- Unstable Angina
- Non-ST-Elevation MI (NSTEMI) } 2/3
- ST-Elevation MI (STEMI) 1/3


Acute Coronary Syndrome
No ST Elevation
ST Elevation
NSTEMI
Myocardial Infarction
Unstable Angina
NQMI
QwMI

ACS

- Pathophysiology : acute change/destabilization/rupture of coronary arterial plaque with inflammation and acute thrombus formation.

ACS

Evaluation

- History
- Physical
- EKG

} treatment triage

- Serum cardiac markers/enzymes

* R/O requires 8-12 hrs after sx onset

ACS

History

- Age
- Symptoms: Chest pain
  - Quality
  - Onset
  - Duration
  - But…1/3 present with symptoms other than chest pain (older, women, hx. of CHF, diabetes)
- Past Cardiac History
- Coronary Risk Factors

ACS

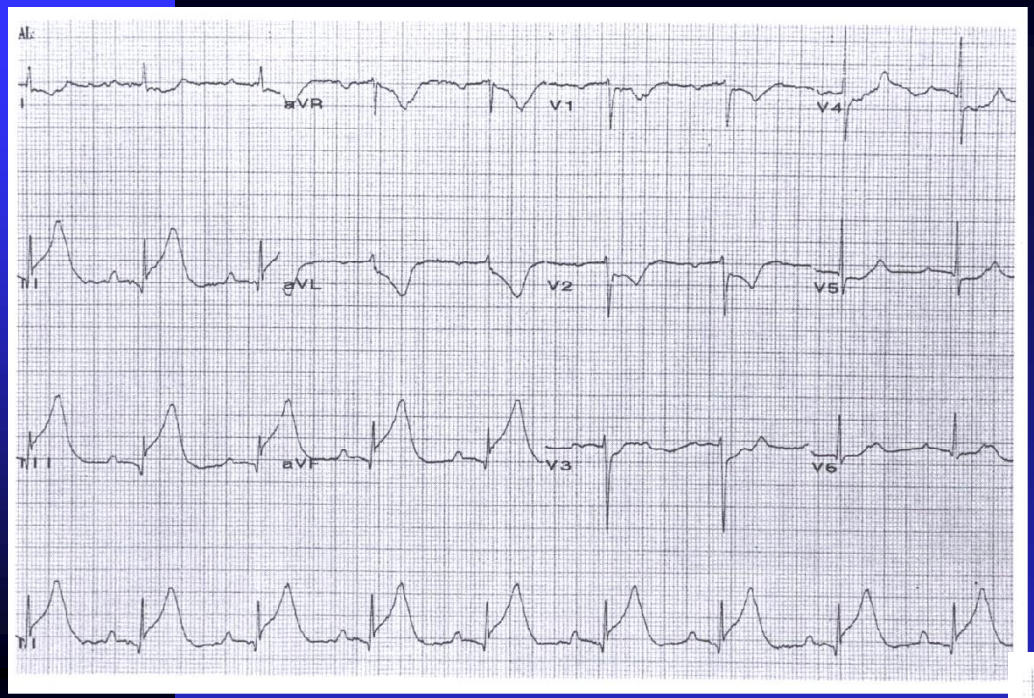
Physical Exam

- General: signs of hypoperfusion (cool, clammy, ashen)
- Vital Signs: hypertensive, hypotensive, tachycardic
- JVP: elevated ?
- Lungs: rales ?
- Heart: murmur (new?), S_3
- Neuro. : signs of prior CVA

ACS

EKG: cornerstone of treatment decision

- ST Elevation: acute reperfusion recommended
  - > 0.1mV in 2 contiguous leads
  - new LBBB
  - acute true posterior MI (ST ⇩ V1-4 with tall R-waves right precordial leads and upright T-waves)
- Non-ST-Elevation: lytics not indicated
  - ST- depression
  - T-wave inversion
  - “normal”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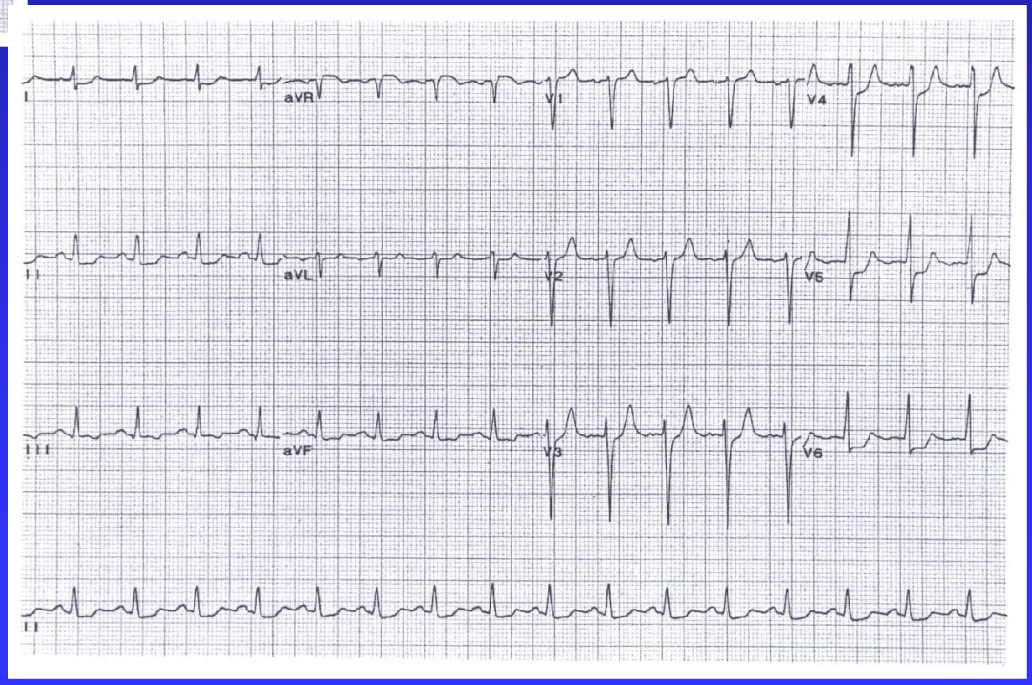
II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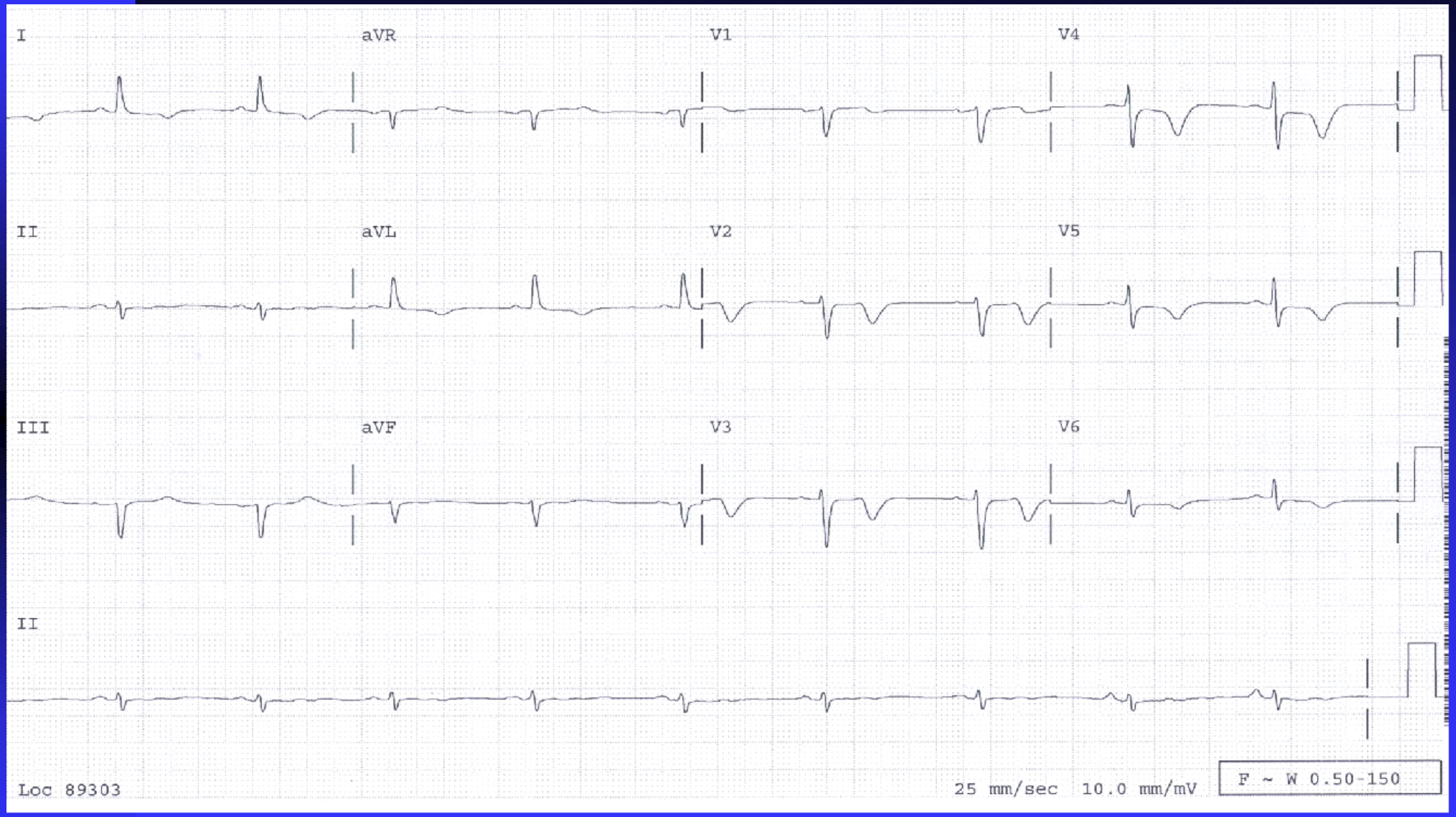
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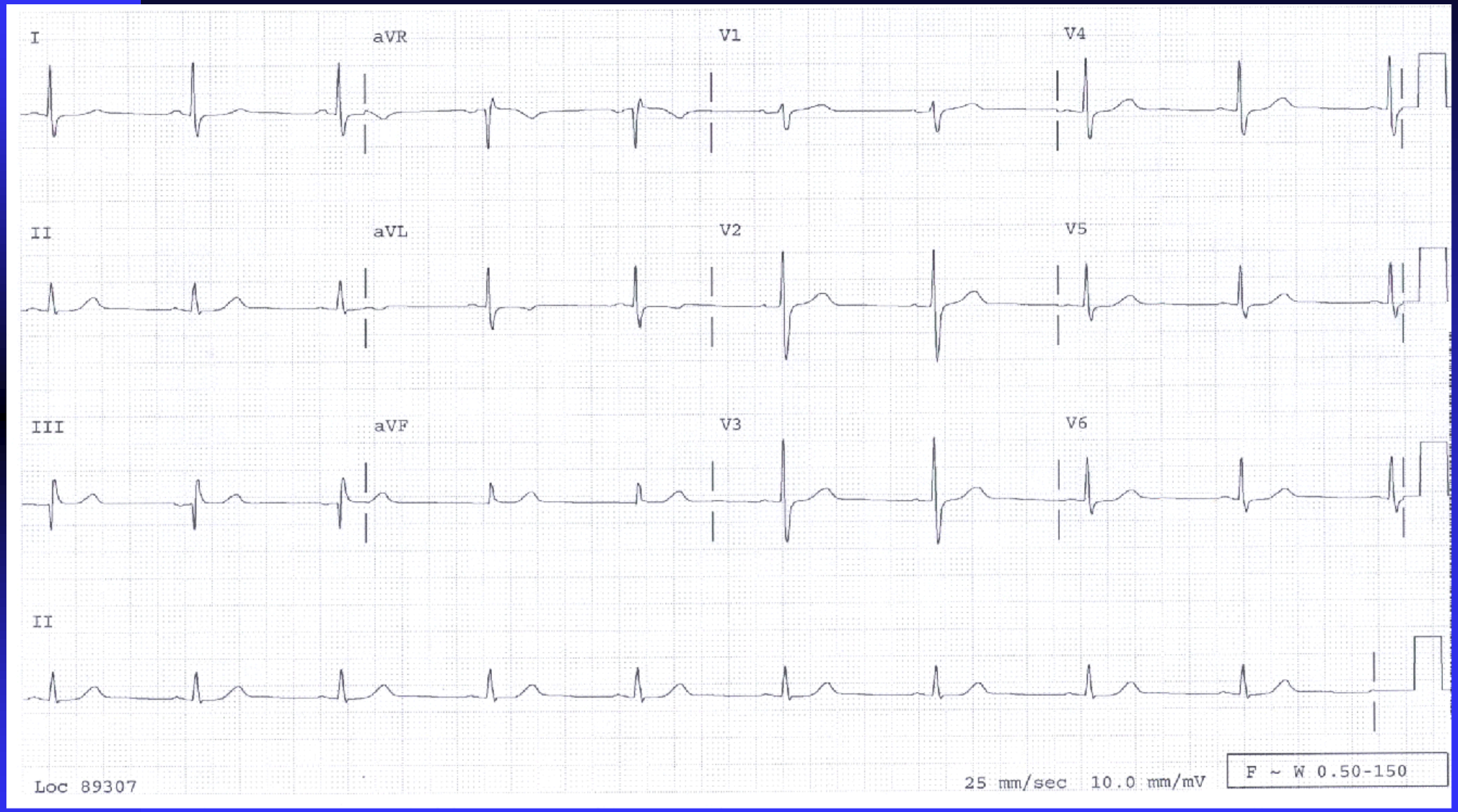
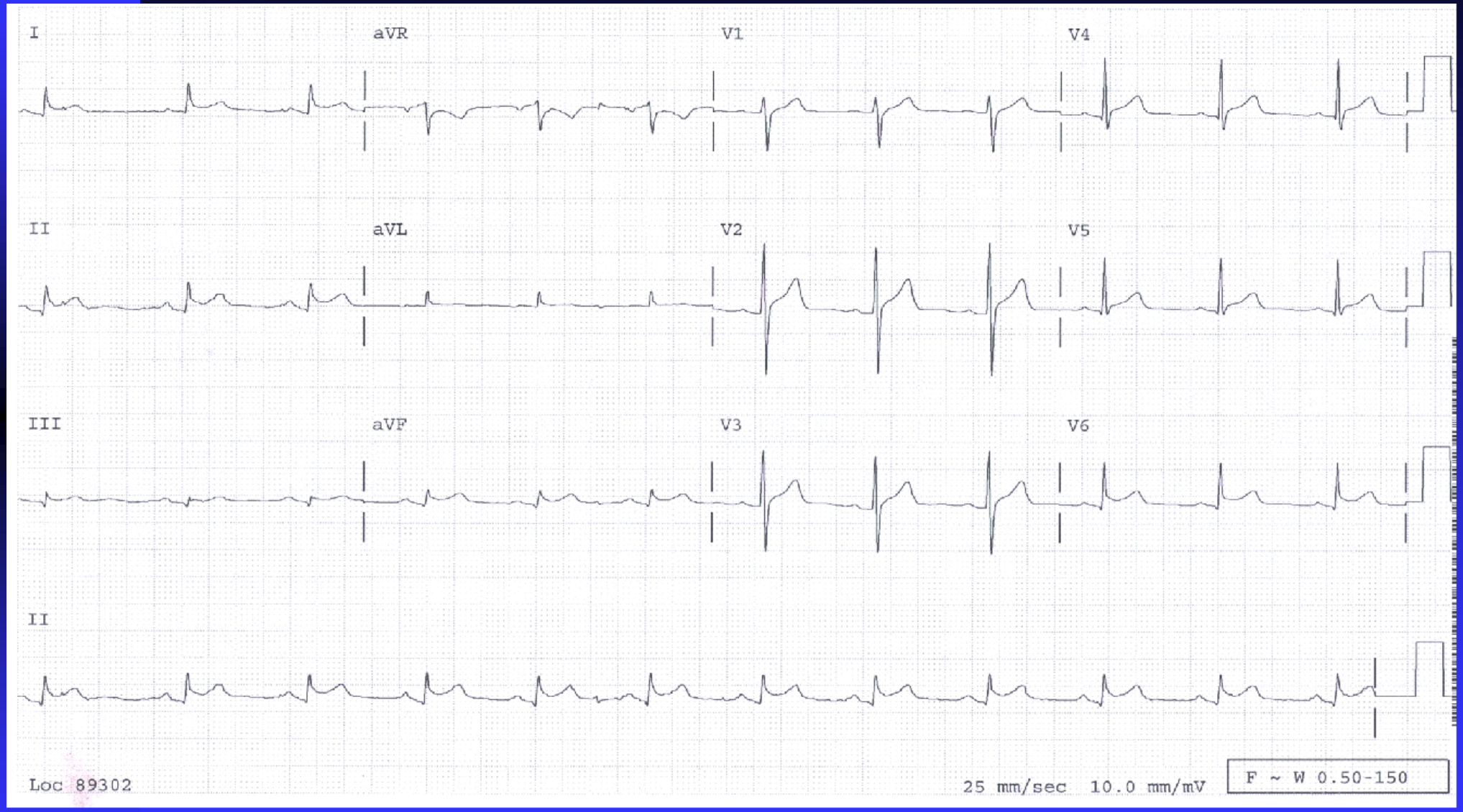


Dynamic ECG changes



ST elevation in II> III, V5 V6

ACS

Serum Cardiac Markers: should not delay treatment

- CK - MB: 6 hrs to 1-3 days
  - Specificity and sensitivity decreased vs. Troponin
  - Value = re-infarct, peri-procedural MI
  - Isolated ⇧ = no value
- Troponin (I, T): 6 hrs to 1-2 weeks
  - preferred biomarker to diagnose myocardial injury
  - specificity and sensitivity increased vs. CK-MB
- Myoglobin: 2 hrs to <24 hrs
  - sensitivity increased: early
  - Not cardiac specific

> * high negative predictive value

ACS
STEMI

- Reperfusion strategy
  - Thrombolytic therapy
  - “Primary” PCI (angioplasty)
  - “Rescue” PCI (post-lytics)
  - “Non-emergent” PCI (post-lytics)
- Infarct related artery patency = predictor of survival
- GREATEST BENEFIT = 1st 2-3 HRS

ACS
STEMI
Thrombolytics: FMC-device time > 120 mins
Door-needle time </= 30 mins

- Alteplase (TPA), Reteplase (rPA), Tenecteplase (TNK)
- 90-min patency rate = 75%-85%
- TIMI-3 Flow = 50-60%
- ⇩ efficacy in patients presenting with CHF or shock
- ACC/AHA: patients with cardiogenic shock or severe heart failure (Killip 3 or 4-pulm edema, shock) should be transferred immediately to a hospital with a cath lab and PCI/CABG capabilities.

ACS
STEMI

Primary Angioplasty:

FMC-device time → </= 90 mins (PCI hosp)

FMC-device time → </= 120 mins (non-PCI hosp)

- Patency and TIMI-3 flow rate: ≥ 90%
- Logistics
- The greater the risk = the greater the benefit (ie. anterior MI, heart failure, shock)

ACS
STEMI
Antiplatelet Therapy

- ASA load : 160-325mg (uncoated)
- Clopidogrel: 75 mg daily
  * load = 300 mg (lytic tx & < 75 yo)
  * load = 600 mg (PCI)
  * newer = prasugrel (60 mg), ticagrelor (180 mg)
    - [avoid prasugrel if hx CV/TIA, age>75, wt < 60 kg] -

ACS - STEMI
Anticoagulant Therapy

- Primary PCI:
  UFH
  or…Bivalirudin
- Lytics:
  UFH (48 hrs)
  or…LMWH (duration of hosp)
  or…Fondaparinux (duration of hosp)

ACS STEMI Summary

PCI hosp	Non-PCI hosp
⇩	⇩
Primary PCI	Transfer for PCI if FMC-device time </= 120 mins
⇩	[DIDO </= 30 mins]
FMC-device time </= 90 mins	or…
	Lytics if FMC-device time > 120 mins… then transfer for cath

ACS
STEMI
Rescue Angioplasty

- def.: emergent PCI after failed fibrinolysis
  (determined by sx, EKG, hemodynamics)
- Recommendations:
  - Cardiogenic Shock
  - Severe heart failure
  - Ongoing ischemia = CP, ST↑ @ 90 min

ACS
STEMI

- Delayed Invasive Management:

  Routine early cath (3-24 hrs) after lytic tx in all patients (class IIa) !!!

ACS
NSTEMI

Treatment

- "Lytics" not indicated
- Angioplasty = "Invasive strategy"
- Medical therapy = "Conservative strategy"
  * non-high risk patients

ACS
NSTEMI
Medical Therapy

Conservative: ischemia-driven strategy

- ASA
- Plus … Clopidogrel or Ticagrelor
- Plus … Anticoagulant

Invasive Strategy: urgent/immediate or within 24-72 hrs

- ASA
- Plus … Clopidogrel or Ticagrelor
- Plus … Anticoagulant
- ? Plus… IIb/IIIa (high risk patients)

I

ACS
NSTEMI

Medical Therapy

- Anti-Coagulant
  - Low Molecular Weight Heparin
  - Unfractionated Heparin (UFH)
  - Fondaparinux
  - Bivalirudin (invasive strategy, omit GP 2b/3a)
- Anti-Platelet / IIb-IIIa inhib (parenteral)
  - Abciximab (Reopro): option with PCI (GUSTO-IV ACS)
  - Tirofiban (Aggrastat): with/without PCI (Prism Plus)
  - Eptifibitide (Integrellin): with/without PCI (Pursuit)
- Anti-Platelet (enteral)
  - Clopidigrel (CURE)

ACS
NSTEMI

Risk Stratification

- Early invasive strategy: ? All
- TIMI score, GRACE, PURSUIT
- Hemodynamic or electrical instability
- Elevated cardiac markers
  - Troponin
  - ? BNP
- Acute EKG changes: ST-depression, new BBB
- Prior MI, CABG, PCI (in 6 mos)
- Age (> 75)
- Multiple coronary risk factors

ACS
Adjunctive Medical Therapy

Oxygen

ASA

Nitrates = SL +/- IV

*Caution: recent ED med use, RVMI, low BP, tachy, brady

Morphine:

* STEMI = class 1

* UA/NSTEMI = class IIb

ACS
Adjunctive Medical Therapy

- Beta Blockers:

  Oral = 1st 24 hrs

  IV = avoid unless HTN or tachyarrhythmia

  * COMMIT = ⇧ risk cardiogenic shock (day 0-1)

    ⇩ risk re-infarct & VFib (> day 1)

  * Avoid: CHF, PR >240 ms, 2nd or 3rd degree AVB, asthma

  * Caution - risk markers for shock:

    age >70yo, BP< 120, HR >110 or <60, late presentation

ACS
Adjunctive Medical Therapy

- ACE inhibitors: within 24 hours, oral dosing
  - *Ant MI, or EF </= 40%, or CHF (class I)
  - *All STEMI patients (class IIa)
- Aldosterone
- * LVEF </= 40% and CHF or diabetes (class I)
- Statin = high dose

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Adjunctive Medical Therapy

NSAID's

All are contraindicated during hospitalization for AMI = except Aspirin

* ⇧ risk of death, reinfarct, HTN, CHF, cardiac rupture.

ACS

Complications

- Electrical instability
- Hemodynamic instability / Shock
- CHF
- Depressed LV function (EF<40%)
- Recurrent ischemia

ACS

Complications

- CHF/shock : stabilize → transfer
  - Diagnosis: Echo
  - Treatment: Meds., IABP, Cath / revascularization

ACS

Mechanical Complications

- "Pump" failure: right, left, both : reperfusion
- Acute MR
- Acute Septal rupture ("VSD")
- Free wall rupture

} echo surgery

ACS

Right Ventricular Infarction - Complications

- Diagnosis
  - inferior MI = ~ 1/3 of patients
  - ST ⇧ V1, V4-R
  - Triad = Hypotension, JVD, “Clear” lungs
  - Echocardiogram
- Treatment - Volume, Catecholamines, maintain A-V synchrony, early reperfusion
- Prognosis - ⇩

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Electrical Complications

- Brady-arrhythmia
- Tachy-arrhythmia
  - SVT
    - sinus tach
    - other
  - VT

ACS

Electrical Indications for Pacing

- Prognosis: extent of myocardial necrosis
- Indications (transvenous or transcutaneous)
  - Symptomatic bradycardia
  - 2^0 AVB - Mobitz II
  - 3^0 AVB
  - RBBB plus fascicular block
  - New BBB
  - Asystole
  - Alternating BBB

ACS
Ventricular Arrhythmias

early

- VT/VF: ACLS guidelines
- Non-sustained VT, PVC's, idioventricular rhythm: no anti-arrhythmic

Late (>48 hrs.)

- VT/VF: electrophysiology evaluation for ICD
- NSVT: LVEF evaluation; electrophysiology evaluation
- Prophylaxis: ICD for recovered (> 90 days)

  EF < 30 (NYHA I) -35% (NYHA II-III)

ACS

Risk Stratification - Re-visited

- LVEF: Echo, Nuclear
- Ischemia: Stress testing
  - Submaximal: pre-discharge
  - Symptom limited: early post-discharge
- Risk: ischemia, ⇩ EF (<40%), hemodynamic instability/CHF, ventricular electrical instability, diabetes, prior revascularization

ACS

Secondary Prevention

- Statin: atorvastatin 80 mg daily
- ASA lifelong: 75-162mg (lifelong)
- ACE inhibitor: maybe all
- Beta-blocker: long term
- Aldosterone antagonist: impaired LV (EF</=40%)… w/ CHF or DM (EPHESUS trial)
- Warfarin anticoagulation: thrombus, atrial fibrillation, ? extensive regional wall motion abnormality (eg: anterior MI) = but CAUTION with dual anti-plt tx.
- Clopidogrel: ASA intolerant, post-stent, USA, NSTEMI, STEMI… All ACS ~ 1yr
- Cardiac Rehab