

2019

Acute Coronary Syndrome

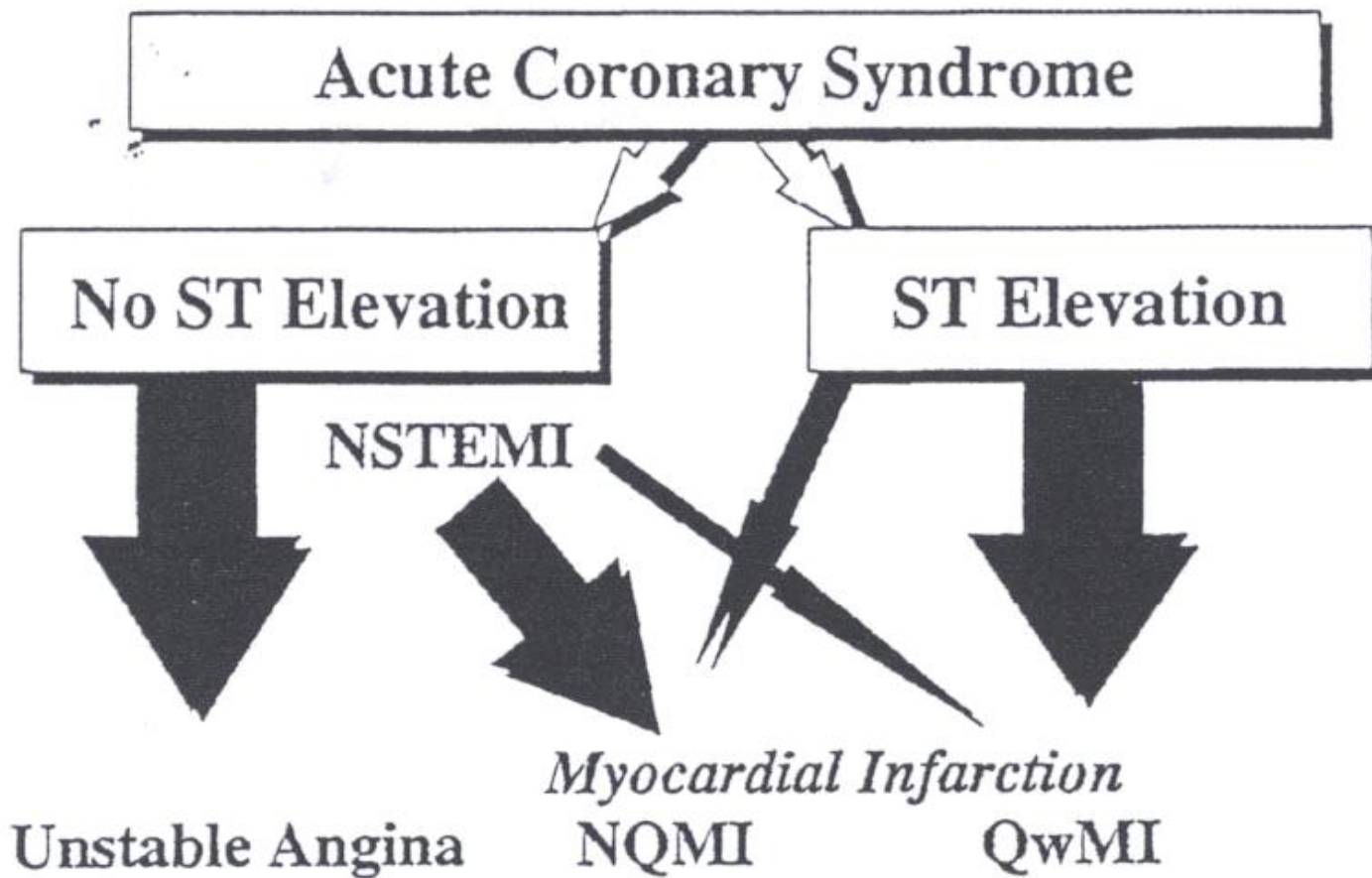
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ACS

Definitions: Acute Myocardial Ischemia

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



ACS

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

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Evaluation

- History
 - Physical
 - EKG
 - Serum cardiac markers/enzymes
 - * Elevation indicates myocardial injury !!
 - * Must be evaluated within *clinical context* !!
 - * R/O requires 8-12 hrs after sx onset
- } treatment triage

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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


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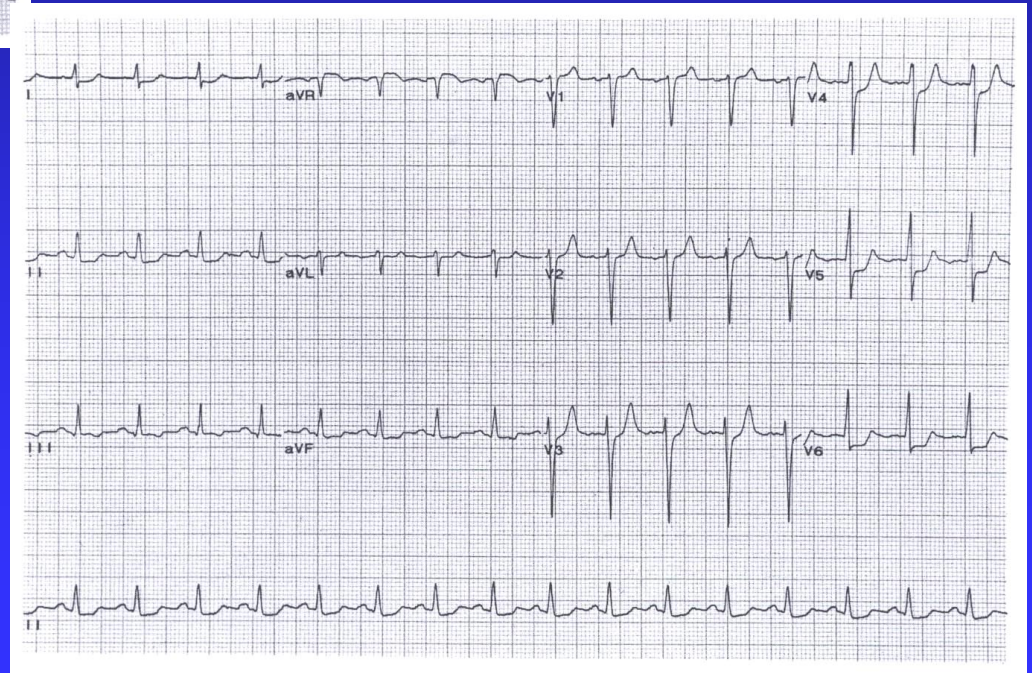
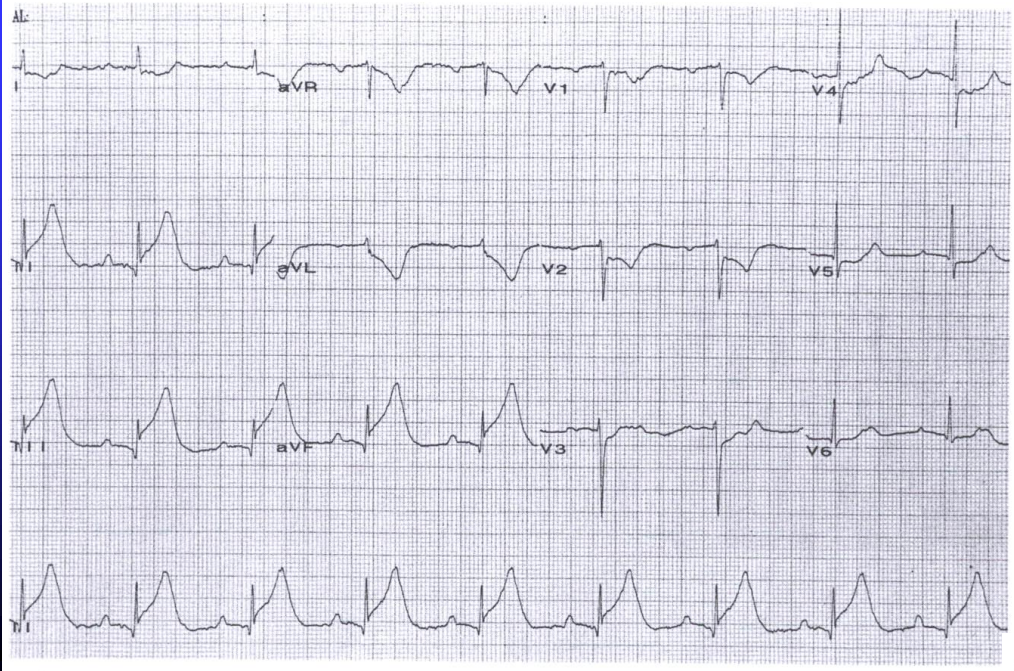
Physical Exam

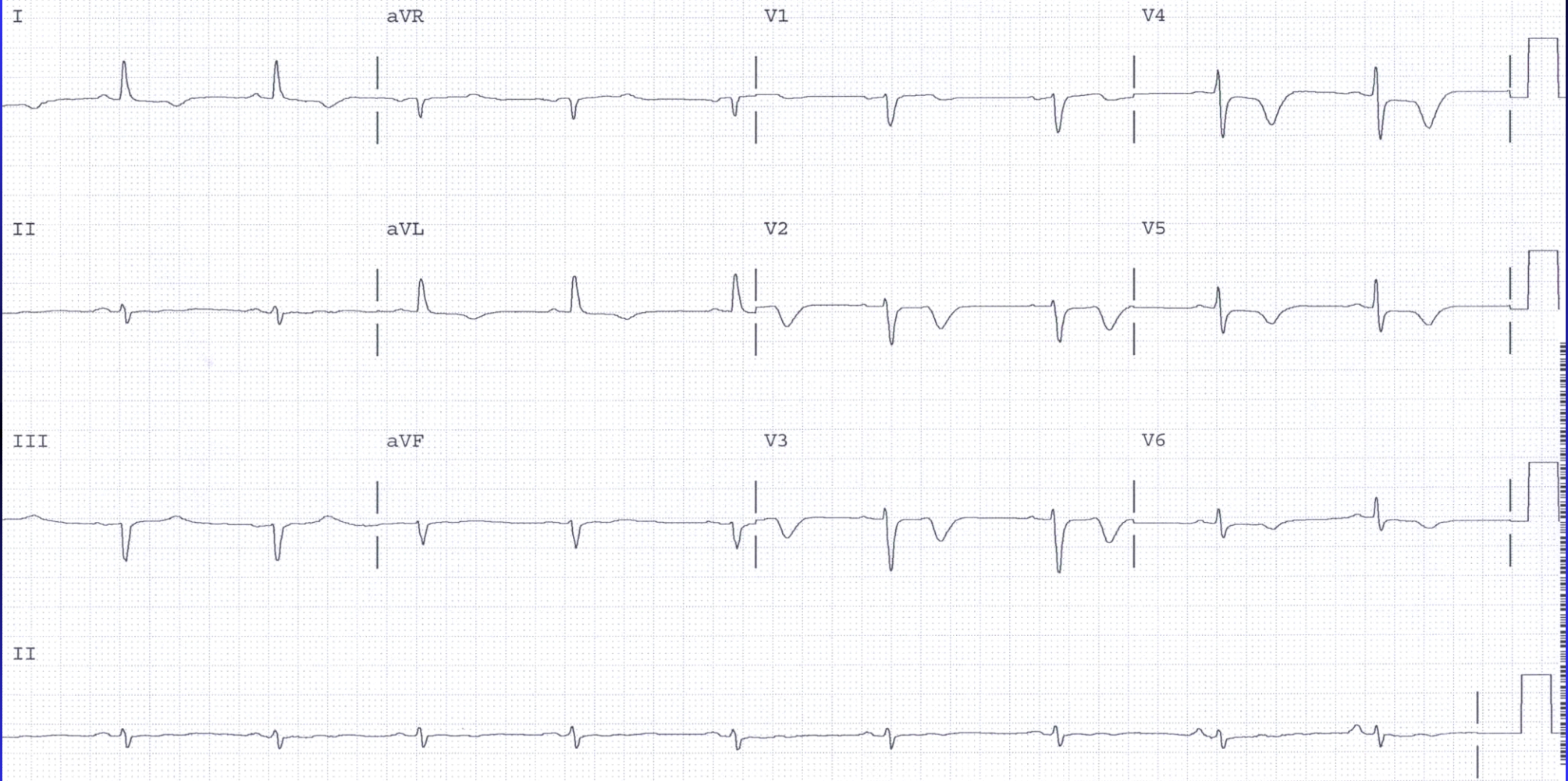
- General: signs of hypoperfusion (cool, clammy, ashen)
- Vital Signs: hypertensive, hypotensive, tachycardic
- JVP: elevated ?
- Lungs: rales ?
- Heart: murmur (new?), S_3
- Neuro. : signs of prior CVA

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EKG: cornerstone of treatment decision

- ST Elevation: acute reperfusion recommended
 - $> 0.1\text{mV}$ in 2 contiguous leads
 - *exception: ≥ 2 mm male or ≥ 1.5 mm female for leads V2-3.
 - 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”

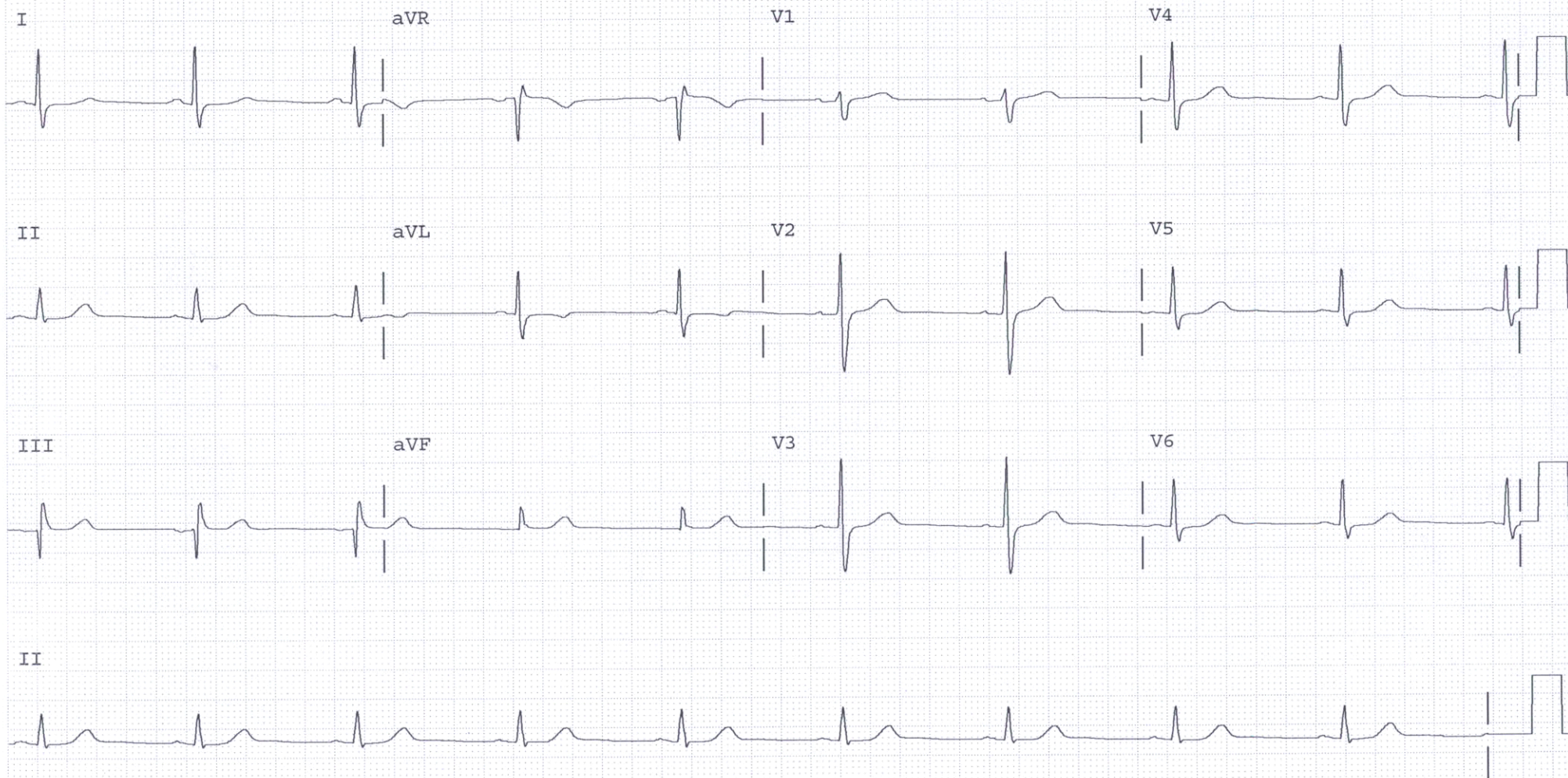




Loc 89303

25 mm/sec 10.0 mm/mV

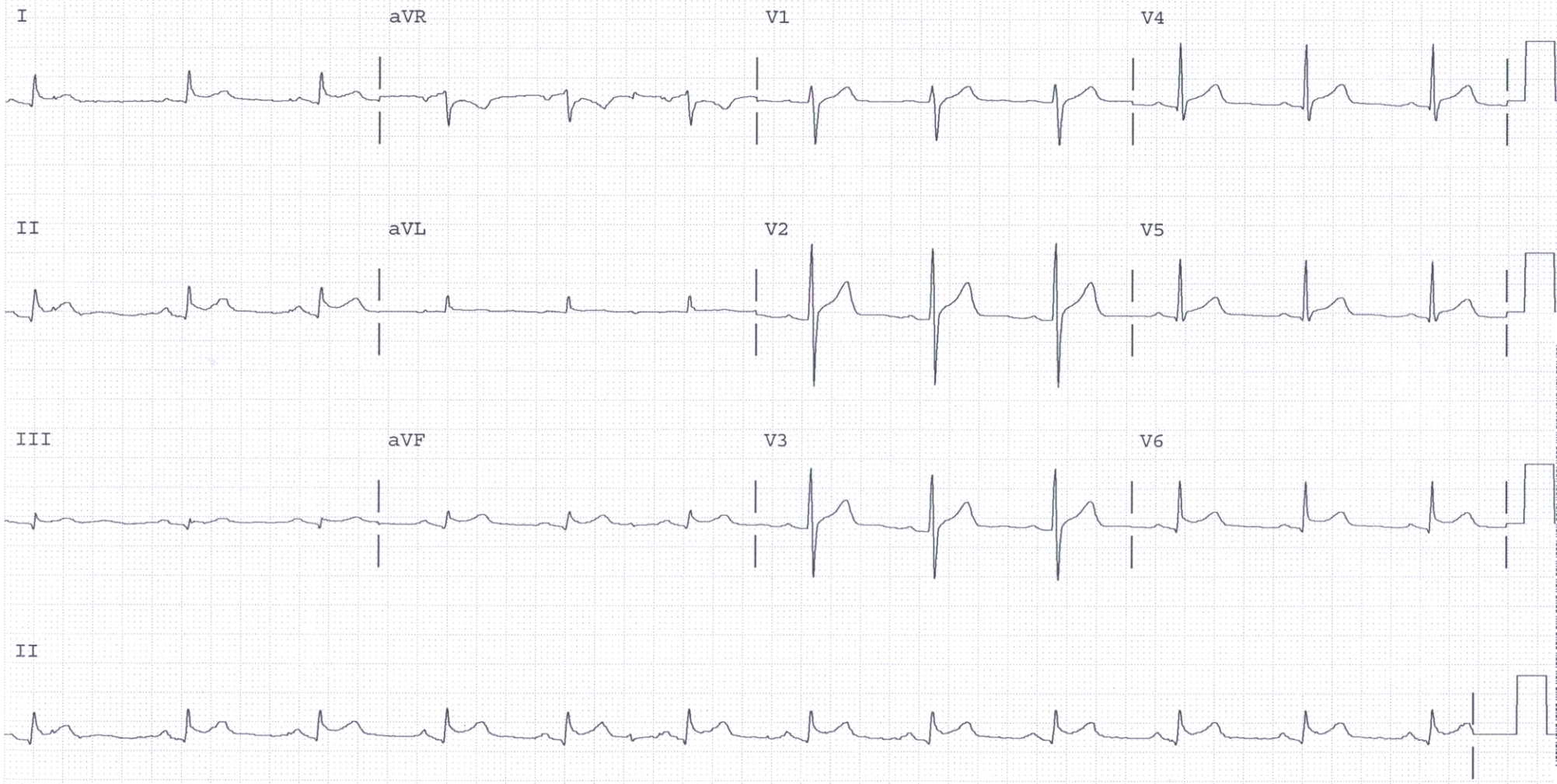
F ~ W 0.50-150



Loc 89307

25 mm/sec 10.0 mm/mV

F ~ W 0.50-150



Loc 89302

25 mm/sec 10.0 mm/mV

F ~ W 0.50-150

ACS

Serum Cardiac Markers: should not delay treatment

- 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

* CK - MB: 6 hrs to 1-3 days

Specificity and sensitivity decreased vs. Troponin

Value = re-infarct, peri-procedural MI

Isolated ↑ = no value

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STEMI

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

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STEMI

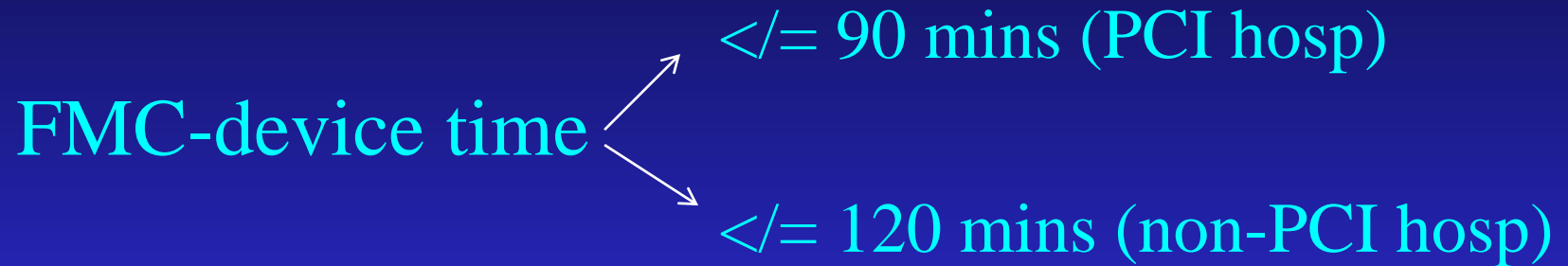
Thrombolytics: FMC-device time > 120 mins

Door-needle time \leq 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) should be transferred immediately to a hospital with a cath lab and PCI/CABG capabilities.

ACS STEMI

Primary Angioplasty:



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

ACS STEMI Antiplatelet Therapy

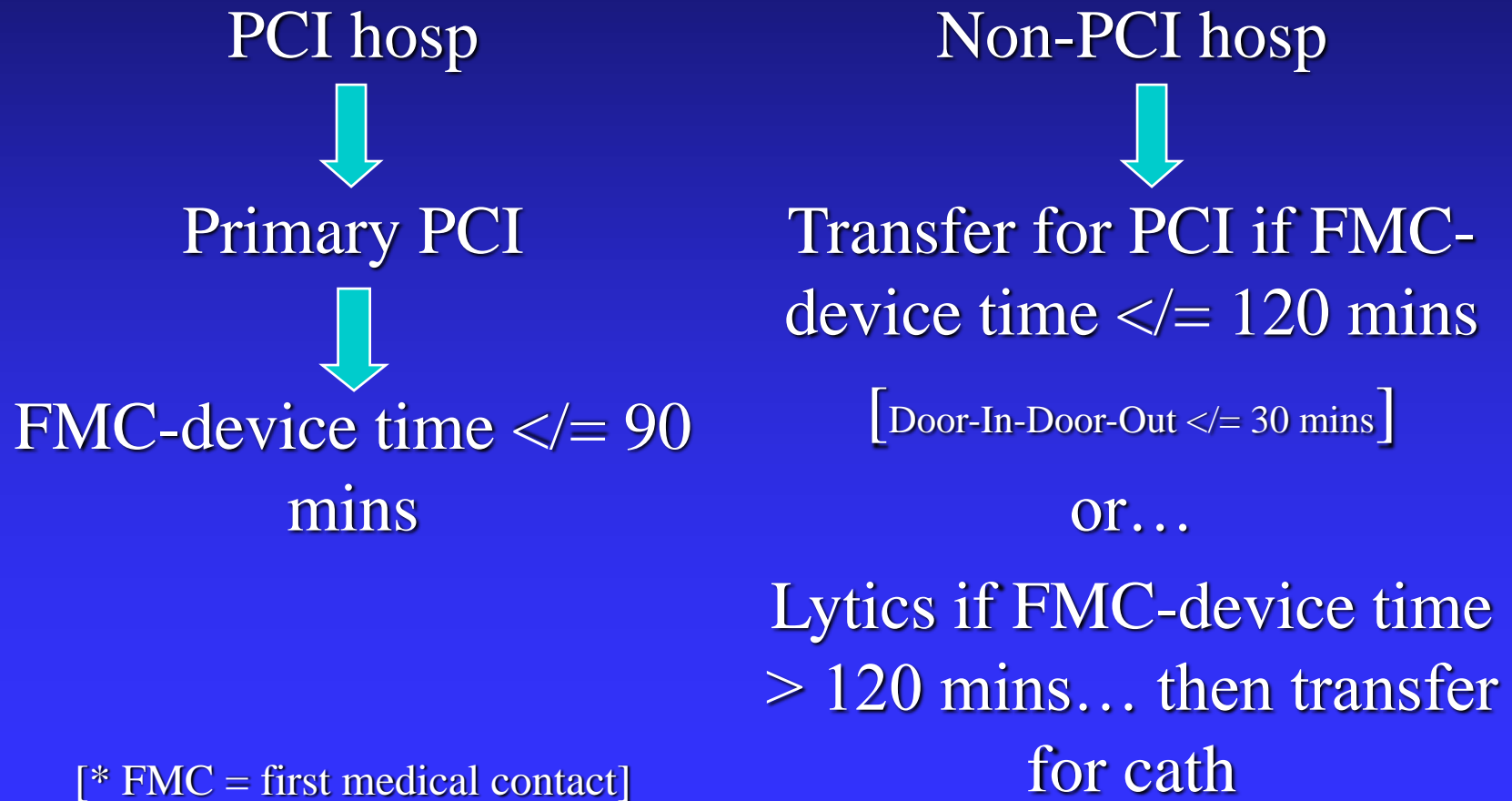
- ASA load : 160-325mg (uncoated)
PLUS
- P2Y₁₂ Inhibitor: eg = Clopidogrel
 - * load = 300 mg (lytic tx & < 75 yo)
 - * load = 600 mg (PCI)
 - * Maintenance = 75 mg daily
 - * newer = prasugrel (60 mg), ticagrelor (180 mg)
- [avoid prasugrel if hx CVA / TIA] -

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



[* FMC = first medical contact]

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 = “Early / Immediate Invasive strategy”
 - * Early or immediate cath +/- PCI
- Medical therapy = “Ischemia-guided strategy”
 - * Low risk patients = eg: normal ECG with neg troponin
 - * Cath +/- PCI if spontaneous or inducible ischemia during hospitalization

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, (or prasugrel if stent)

Plus ... Anticoagulant

?? Plus... IIB/IIIa (high risk patients) = eptifibatide, tirofiban

ACS NSTEMI

Medical Therapy

- Anti-Coagulant
 - ❖ Low Molecular Weight Heparin
 - ❖ Unfractionated Heparin (UFH)
 - ❖ Fondaparinux
 - ❖ Bivalirudin (invasive strategy)

- Anti-Platelet (enteral)
 - Clopidigrel
 - Ticagrelor
 - Prasugrel (if stent)

ACS NSTEMI

Risk Stratification

- Historical
- Current: onset → post-discharge
- Predict event risk:
 - ❖ recurrent ischemia
 - ❖ (re) MI
 - ❖ Death

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

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Adjunctive Medical Therapy

Nitrates = SL +/- IV

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

Morphine:

* STEMI = class 1

* UA/NSTEMI = class IIb

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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

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Adjunctive Medical Therapy

- ACE inhibitors: within 24 hours, oral dosing
 - * Ant MI, or EF \leq 40%, or CHF (class I)
 - * All STEMI patients (class IIa)
- Aldosterone antagonist:
 - * LVEF \leq 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.

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Complications

- Hemodynamic instability = shock, CHF
- Electrical instability
- Depressed LV function (EF<40%)
- Recurrent ischemia

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Complications: hemodynamic instability

- CHF/shock : stabilize → transfer
 - Diagnosis: Echo
 - * Is it d/t LV dysfxn (“ bad pump”) or a mechanical complication
 - Treatment: Meds., IABP, Cath /revascularization

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Pump or Mechanical Complications

- “Pump” failure: right, left, both : reperfusion
 - Acute MR
 - Acute Septal rupture (“VSD”)
 - Free wall rupture
- } *echo
*surgery


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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

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Electrical Indications for Pacing

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

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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 (> 6-13 wks)
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 or rosuvastatin 20-40 mg daily
- ASA lifelong: 75-162mg (lifelong)
- ACE inhibitor: maybe all (but esp. reduced LV function)
- Beta-blocker: long term (metoprolol succinate, carvedilol, or bisoprolol if LVEF reduced $\leq 40\%$)
- Aldosterone antagonist: impaired LV (EF $\leq 40\%$)... w/ CHF or Diabetes (EPHESUS trial)
- Anticoagulation (warfarin or DOAC): thrombus, atrial fibrillation, ? extensive regional wall motion abnormality (eg: anterior MI) = CAUTION with dual anti-plt tx.
- P2Y₁₂ receptor inhib (eg: Clopidogrel): All ACS ~ 1yr (stent or no stent)
- Cardiac Rehab = class I recommendation (STEMI and NSTEMI)