Healthy Heart

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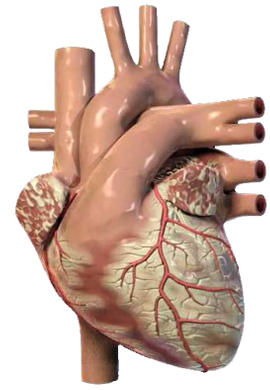

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From the desk of editor:

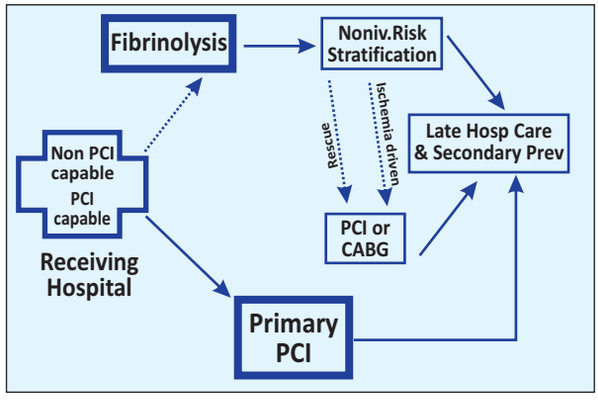
Dear Readers,

We all know that ideal treatment of Acute STEMI (ST-elevation myocardial infarction) remains primary angioplasty. In the real world scenario, most of the hospitals worldwide are not equipped with cath lab facility. "Time is muscle" and each second is very important once patient presents with acute STEMI. 80 % of Indian population lives in rural area and it may takes hours to shift a patient to interventional centre. Once the diagnosis of Acute STEMI confirms, the door to needle time and door to balloon time should be 30 and 90 minutes respectively. Each patient should be individualized and physician who is handling such types of cases should take the decision whether to transfer patient to a higher level and manage efficiently at place where patient presents with acute symptoms. In this news letter, I have highlighted salient features of ACC/AHA guidelines to manage a patient with Acute STEMI at the primary and secondary care level.

Dr. Satya Gupta

Management of Acute STEMI: Salient recommendations

Initial Patient Evaluation : The delay from patient contact with the healthcare system to initiation of fibrinolytic therapy should be less than 30 minutes. Alternatively, if PCI (Percutaneous Coronary Intervention) is chosen, the delay should be less than 90 minutes. **Figure 1**



History : History should focus on presence of hypertension, diabetes mellitus, possibility of aortic dissection, risk of bleeding, clinical cerebrovascular disease, stable or unstable angina, MI, CABG (Coronary Artery Bypass Graft), or PCI.

Physical Examination : Examination should be performed to aid in the diagnosis and assessment of the extent, location, and presence of complications of STEMI. A brief, neurological examination to look for evidence of prior stroke or cognitive deficits should be performed before administration of fibrinolytic therapy.

Electrocardiogram : A 12-lead ECG should be performed and shown to an experienced emergency physician within 10 minutes of ER arrival for all patients with chest discomfort.

If the initial ECG is not diagnostic, but the patient remains symptomatic, and there is a high clinical suspicion for STEMI, serial ECGs at 5- to 10-minute intervals or continuous 12-lead ST-segment monitoring should be performed to detect the potential development of ST elevation.

In patients with inferior STEMI, right-sided ECG leads should be obtained to screen for ST elevation suggestive of RVMI (Right Ventricular Myocardial Infarction).

Laboratory Examinations : Once the diagnosis of STEMI is secure; initiation of reperfusion therapy should not be delayed to wait for the results of a cardiac biomarker assay. Quantitative analysis of cardiac biomarker measurements provides prognostic information.

Routine Measures

a. Oxygen : Supplemental oxygen should be administered to patients with arterial oxygen desaturation (SaO2 < 90%). It is reasonable to administer supplemental oxygen to all patients with uncomplicated STEMI during the first 6 hours.

b. Nitroglycerin : Patients with ongoing chest pain should receive sublingual nitroglycerin (0.4 mg) every 5 minutes for a total of 3 doses, after which an assessment should be made about the need for IV nitroglycerin. IV nitroglycerin is indicated for relief of ongoing pain, control of hypertension, or management of pulmonary congestion.

Nitrates should not be administered to patients with SBP< 90 mm Hg or > 30 mm Hg below baseline, severe bradycardia (<50 bpm), tachycardia (>100 bpm), or suspected RV MI and patient who have received a phosphodiesterase inhibitor for erectile dysfunction within the last 24 hours (48 hours for tadalafil).

c. Analgesia : Morphine sulfate (2 to 4 mg IV with increments of 2 to 8 mg IV repeated at 5 - 15 minute intervals) is the analgesic of choice for management of pain associated with STEMI. Alternatively , Inj Norphine can be given if available. Routine sedatives should be avoided during acute episode and ongoing chest pain.

d. Aspirin : Aspirin should be chewed by patients who have not taken aspirin before presentation with STEMI. The initial dose should be 162 mg to 325 mg. Rapid buccal absorption occurs with non–enteric-coated aspirin formulations.

e. Beta-Blockers : Oral beta-blocker therapy should be administered promptly to those without a contraindication, irrespective of concomitant fibrinolytic therapy or performance of primary PCI. It is reasonable to administer IV beta-blockers promptly to patients with tachyarrhythmia hypertension.

Immediate beta-blocker therapy appears to reduce the magnitude of infarction and incidence of associated complications in subjects not receiving concomitant fibrinolytic therapy, the rate of reinfarction in patients receiving fibrinolytic therapy, and the frequency of life-threatening ventricular tachyarrhythmias.

f. Reperfusion : Several issues should be considered in selecting the type of reperfusion therapy:

- **Time From Onset of Symptoms.** The efficacy of fibrinolytic agents in lysing thrombus diminishes with the passage of time. Fibrinolytic therapy administered within the first 2 hours (especially the first hour) can occasionally abort MI and dramatically reduce mortality.
- **Risk of STEMI.** When the estimated mortality with fibrinolysis is extremely high, e.g. in patients with cardiogenic shock, compelling evidence exists that favors a PCI strategy.
- **Risk of Bleeding.** Choice of reperfusion therapy is also affected by the patient's risk of bleeding. If the suspected risk of bleeding is more with fibrinolytic therapy, the more strongly the decision should favor PCI. If PCI is unavailable, then the benefit of pharmacological reperfusion therapy should be balanced against the risk.
- **Time Required for Transport to a Skilled PCI Laboratory.** For facilities that can offer PCI, PCI approach is superior to pharmacological reperfusion. The experience and location of the PCI laboratory plays a role in the choice of therapy. Not all laboratories can provide prompt, high-quality primary PCI. Even centers with interventional cardiology facilities may not be able to provide the staffing required for 24-hour coverage of the catheterization laboratory. Despite staffing availability, the volume of cases in the laboratory may be insufficient for the team to acquire and maintain skills required for rapid PCI reperfusion strategies.

Indications for Fibrinolytic Therapy

In the absence of contraindications (Table-1), fibrinolytic therapy should be administered to STEMI patients with

- Symptom onset within the prior 12 hours and ST elevation greater than 0.1 mV in at least 2 contiguous precordial leads or at least 2 adjacent limb leads.
- Symptom onset within the prior 12 hours and new or presumably new LBBB.
- Symptom onset within the prior 12 hours and 12-lead ECG findings consistent with a true posterior MI.
- Symptoms beginning within the prior 12 to 24 hours who have continuing ischemic symptoms and ST elevation greater than 0.1 mV in at least 2 contiguous precordial leads or at least 2 adjacent limb leads.

Fibrinolytic therapy should not be administered to asymptomatic patients whose initial symptoms of STEMI began more than 24 hours earlier and to patients whose 12-

lead ECG shows only ST-segment depression except if a true posterior MI is suspected.

Table-1 : Contraindications/Cautions for Thrombolysis

Absolute contraindications
■ Any prior ICH
■ Known structural cerebral vascular lesion (eg, AVM*)
■ Known malignant intracranial neoplasm (primary or metastatic)
■ Ischemic stroke within 3 months EXCEPT acute ischemic stroke within 3 hours
■ Suspected aortic dissection
■ Active bleeding or bleeding diathesis (excluding menses)
■ Significant closed head or facial trauma within 3 months
Relative contraindications
■ History of chronic severe, poorly controlled hypertension
■ Severe uncontrolled hypertension on presentation (SBP > 180 mm Hg or DBP > 110 mm Hg)
■ History of prior ischemic stroke greater than 3 months, dementia, or known intracranial pathology not covered in contraindications
■ Traumatic or prolonged (greater than 10 minutes) CPR or major surgery (less than 3 weeks)
■ Recent (within 2 to 4 weeks) internal bleeding
■ Noncompressible vascular punctures
■ For streptokinase/anistreplase: prior exposure (more than 5 days ago) or prior allergic reaction to these agents
■ Pregnancy
■ Active peptic ulcer
■ Current use of anticoagulants: the higher the INR, the higher the risk of bleeding
*Arteriovenous Malformation

Complications of Fibrinolytic Therapy: The occurrence of a change in neurological status during or after reperfusion therapy, particularly within the first 24 hours after initiation of treatment, is considered to be due to ICH (Intracranial Hemorrhage) until proven otherwise. Fibrinolytic, antiplatelet, and anticoagulant therapies should be discontinued until brain imaging scan shows no evidence of ICH.

In patients with ICH, infusions of cryoprecipitate, fresh frozen plasma, protamine, and platelets should be given, as dictated by clinical circumstances.

Assessment Of Reperfusion : Noninvasive findings suggestive of reperfusion include relief of symptoms, maintenance or restoration of hemodynamic and or electrical stability, and a reduction of at least 50% of the initial ST-segment elevation injury pattern on a follow-up ECG at 60 to 90 minutes after initiation of therapy.

Persistence of unrelenting ischemic chest pain, absence of resolution of the qualifying ST-segment elevation, and hemodynamic and/or electrical instability are generally indicators of failed pharmacological reperfusion and the need to consider rescue PCI.

Heparin :

UFH (Unfractionated heparin) : UFH should be given intravenously to patients undergoing reperfusion therapy with alteplase, reteplase, or tenecteplase, with dosing as follows: bolus of 60 U/kg (maximum 4000 U) followed by an initial infusion of 12 U/kg per hour (maximum 1000 U/hr) adjusted to maintain aPTT at 1.5 to 2.0 times control (approx. 50-70 seconds).

UFH should be given intravenously to patients treated with nonselective fibrinolytic agents (streptokinase, anistreplase, or urokinase) who are at high risk for systemic emboli (large or anterior MI, atrial fibrillation, previous embolus, or known LV thrombus).

LMWH (Low Molecular Weight Heparin) : LMWH might be considered an acceptable alternative to UFH.

Direct antithrombins : In patients with known heparin-induced thrombocytopenia, it is reasonable to consider bivalirudin as a useful alternative to heparin.

Antiplatelets

Aspirin : A daily dose of aspirin (initial dose of 162 to 325 mg orally; maintenance dose of 75 to 162 mg) should be given indefinitely after STEMI to all patients without a true aspirin allergy.

Thienopyridines : Clopidogrel can be given for one month after acute STEMI alongwith aspirin.

Inhibition of RAAS : An ACE inhibitor should be administered orally within the first 24 hours of STEMI to patients with AWMI (Anterior Wall MI), pulmonary congestion, or LVEF < 40 %, in the absence of hypotension or known contraindications to that Class.

An ARB should be administered to STEMI patients who are intolerant of ACE inhibitors.

Strict Glucose Control During STEMI : During the acute phase (first 24 to 48 hours) of the management, it is reasonable to administer an insulin infusion to normalize blood glucose, even in patients with an uncomplicated course.

After the acute phase of STEMI, it is reasonable to individualize treatment of diabetics, selecting from a combination of insulin, insulin analogs, and oral hypoglycemic agents that achieve the best glycemic control.

Magnesium : Documented magnesium deficits be corrected, especially in patients receiving diuretics before the onset of STEMI. Episodes of torsade de pointes-type ventricular tachycardia (VT) associated with a prolonged QT interval be treated with 1 to 2 g of magnesium administered as an intravenous bolus over 5 minutes.

Calcium Channel Blockers : Verapamil or diltiazem can be given to patients in whom beta-blockers are ineffective or contraindicated (eg, bronchospastic disease) for relief of ongoing ischemia or control of a rapid ventricular response with atrial fibrillation or flutter after STEMI in the absence of CHF, LV dysfunction, or atrioventricular (AV) block. Nifedipine (immediate-release form) is contraindicated in treatment of STEMI because of the reflex sympathetic activation, tachycardia, and hypotension associated with its use.

Location

Coronary Care Unit :

1. STEMI patients should be admitted to a quiet and comfortable environment that provides for continuous monitoring of the ECG and pulse oximetry and has ready access to facilities for hemodynamic monitoring and defibrillation.
2. The patient's medication regimen should be reviewed to confirm the administration of aspirin and beta-blockers in an adequate dose to control heart rate and to assess the need for intravenous nitroglycerin for control of angina, hypertension, or heart failure.

Stepdown Unit :

1. It is a useful triage strategy to admit low-risk STEMI patients who have undergone successful PCI directly to the stepdown unit for post-PCI care rather than to the CCU.
2. STEMI patients originally admitted to the CCU who demonstrate 12 to 24 hours of clinical stability (absence of recurrent ischemia, heart failure, or hemodynamically compromising dysrhythmias) should be transferred to the stepdown unit.
3. Uncomplicated AWMI and IWMI can be discharged from hospital safely on 3 & 5 day respectively.

Early, General Measures

Level of Activity :

1. After 12 to 24 hours, it is reasonable to allow patients with hemodynamic instability or continued ischemia to have bedside commode privileges.
2. With STEMI who are free of recurrent ischemic discomfort, symptoms of heart failure, or serious disturbances of heart rhythm should not be on bed rest for more than 12 to 24 hours.

Diet:

1. Patients with STEMI should be prescribed the NCEP Adult Treatment Panel III (ATP III) Therapeutic Lifestyle Changes (TLC) diet, which focuses on reduced intake of fats and cholesterol, less than 7% of total calories as saturated fats, less than 200 mg of cholesterol per day, increased consumption of omega-3 fatty acids, and appropriate caloric intake for energy needs.
2. Diabetic patients with STEMI should have an appropriate food group balance and caloric intake.
3. Sodium intake should be restricted in STEMI patients with hypertension or heart failure.

Patient Education in the Hospital Setting : Patient counseling to maximize adherence to evidence-based post-STEMI treatments (eg, compliance with taking medication, exercise prescription, and smoking cessation) should begin during the early phase of hospitalization, occur intensively at discharge, and continue at follow-up visits with providers and thorough cardiac rehabilitation programs and community support groups, as appropriate.

Analgesia/Anxiolytics : Use anxiolytic in STEMI patients to alleviate short-term anxiety or altered behavior related to hospitalization for STEMI.

Risk Stratification During Early Hospital Course : Indicators of failed reperfusion, worsening clinical status, presence of

mechanical complications (heart failure, presence of new murmur) herald increased risk and suggest the need for rapid intervention. Patients with a low risk of complications may be candidates for early discharge.

Ideal Prescription at Discharge

1. **Aspirin:** All patients should be on Aspirin for life long until unless contraindicated
2. **Clopidogrel:** 75mg daily for at least on month
3. **Statins:** Maximum possible dose (Atorvastatin 80mg) at least for one month, dose to be titrated according to LDL,HDL, TG, LDL/HDL ratio.
4. **B-blockers:** B-blockers to be given to all patients (if not contraindicated) as early as possible after diagnosis of STEMI and should be continue for life long.
5. **ACEI (Angiotensin Converting Enzyme Inhibitors) :** Within 1st 24hrs, all patients (if not contraindicated) to be given ACEI. ARB's can be given if intolerance. At one month, echocardiography can be done and ACEI can be stopped if normal LV function. It should be continue in patients with LV dysfunction, systemic hypertension or diabetics.
6. **Aldosteron Antagonist:** Current evidence suggests that all post MI patients should be on Aldactone or Eplineron at least for one month for better remodeling.
7. **Anxiolytic:** It is better to give Anxiolytic to a anxious or type A personality person.
8. **Stool softener:** It is better to add stool softener to avoid strain at stool for at least initial period.

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