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Thus Sprach Zarathustra

Challenges of STEMI care in India & the real world



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A scenario not infrequently encountered in our practice is given below. A 45-year-old normotensive and non-diabetic male shopkeeper had chest and upper abdominal pain beginning early in the morning. The pain initially was intermittent and temporarily subsided. Our patient attributed the discomfort to upper gastro-intestinal discomfort and he had some home remedies for gastric discomfort. Four hours later, after reaching his workplace, the pain increased and was associated with vomiting. He contacted local general practitioner, who evaluated him and administered injectable ranitidine and antiemetics. There was temporary improvement and he went back to his home. On the way home, he had an episode of fainting and was rushed to the hospital in the nearby town which was 40 km away. He was admitted and found to have extensive ST Elevation anterior wall myocardial infarction (STEMI) with qRBBB. He was thrombolysed with streptokinase with a window period of 14 h. He seemed to be stable. Later in the night, the patient developed acute pulmonary edema and required intravenous diuretics, nitroglycerine and morphine. Next day morning the patient was referred to a PCI capable centre, which was 50 km away. He underwent an angiogram that showed an occluded proximal left anterior descending artery and an ejection fraction of 20–25%. He underwent rescue PCI and stenting to proximal LAD with non medicated stent. The procedure was complicated by no flow and hypotension, for which adjunctive pharmacotherapy along with intra-aortic balloon pump were used. He remained in CCU for 7 days and was later discharged with an ejection fraction of 20–25%. The patient was discharged on multiple medications. One month after his acute MI, the patient continued to have class III dyspnea with exertion and was unable to return to work. A follow-up echocardiogram demonstrated impaired left ventricular systolic function (EF 25%) with severe apical hypokinesis. He was advised an implantable cardiac defibrillator, which he could not afford.

The above scenario is fairly frequently seen by Indian cardiologists even in 2015. The case brings out glaring deficiencies at various levels in STEMI care in India. Individually, we have excellent hospitals, physicians, clinical cardiologists, and cardiac interventionists. Of late we are having good ambulance services, at least in some states. However, we do not have ANY system in place for STEMI care across the country. The world-over dedicated STEMI programs are successfully implemented in many Western countries for nearly three decades. This commentary focuses on the possible systems that may be put in place to improve the acute care of STEMI across India. Most of the improvement in outcomes in Indian patients could be achieved by timely implementation of the proven therapies focusing the time window.

1. Problems in STEMI care in India

Indian ACS patients, for reasons not exactly clear, seem to present with higher percentage of STEMI. They are less likely to receive timely reperfusion therapy, invasive therapy and evidence based medicines.^{1–3} The above patient scenario brings forth a few major lacunae in STEMI care that include lack of dedicated STEMI care systems, lack of instantaneously available ECG facility at first point of medical contact, lack of patient awareness, lack of physician readiness, lack of equipped ambulance systems network for patient transport (Emergency Cardiac Services: ECS) and pay from pocket for even Emergency Medical Services (EMS). These are the major reasons for the excess mortality and poorer outcomes seen in Indian patients with STEMI.³

In a registry involving 50 cities, only 58.5% of patients with STEMI were thrombolysed mostly with streptokinase and a minority received percutaneous coronary intervention (PCI).

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The average delay in presentation was >6 h. The real situation in most parts of India is likely to be lower as these registries have sampled data from tertiary care centres and some of the better developed states. The reported 30-day outcomes for patients with STEMI in the Create registry were death (8.6%), reinfarction (2.3%), and stroke (0.7%).³ Mortality benefits of PPCI are lost if it is delayed more than 60 min as depicted in the Global Registry of Acute Coronary Event.⁴ Importantly, the poor are marginalized in STEMI care and are less likely to receive thrombolytics, percutaneous coronary intervention and even lipid-lowering drugs. Consequently, the mortality was also higher for poor patients.⁵

In the Italian Registry of TNK in STEMI of 27,000 patients.⁶ It has been shown that thrombolysis with TNK is easily accessible, and available everywhere. Door-to-balloon time in PPCI exceeds 90 min practically. Then, PPCI does not reduce mortality consistently. Rapid diagnosis and early reperfusion are pillars of success in STEMI care. TNK is Class 1A recommendation for STEMI ACCP Guideline⁷ and is recommended in Pre-Hospital Thrombolysis Protocol (Vienna STEMI Registry⁸, The Mayo Clinic STEMI Protocol⁹ and The French FAST-MI registry¹⁰). The potential of TNK cannot be overemphasized. It is given as a bolus dose with no hypertension, no allergic reactions, longer half-life, high fibrin specificity and simplified weight-adjusted dose, with mostly very minor manageable bleeding. It is an agent of first choice for pre-hospital thrombolysis in STEMI. It has been shown in one of the studies that only 4% of transferred patients received PPCI within 90 min.¹¹ Pre-hospital thrombolysis is the strongest independent predictor of in-hospital survival in UK.¹²

In the recently published Indian registry on STEMI consisting of 15,222 patients from 722 centres treated with indigenous tenecteplase (TNK) has shown clinically successful thrombolysis in 96.5% of patients in less than 3 h, 96% in three to 6 h and 85.3% in more than 6 h of STEMI.¹³ Pharmacoinvasive therapy including early administration of thrombolysis (TNK) followed by PPCI within 3–24 h after initiation of thrombolytic therapy regardless of success of thrombolysis. However, in case of thrombolytic failure, a rescue PPCI should be instantaneously performed. Timely guided protocol for early thrombolysis with tenecteplase (Grade IA) at the level of physician, non-PCI capable centres/nursing homes with intensive care facility and subsequent access to PCI capable centres improves STEMI outcome.¹⁴ Such a strategy may be the preferred strategy in India as PPCI is possible only in 10% of STEMI patients.¹⁴

2. STEMI care in India: barriers and prospects

There are significant barriers to effective STEMI care. They are at public awareness level, patient level, hospital/physician level and at Government and societal levels. Patients often ignore symptoms, self-medicate and even when they decide to seek medical attention, they consult non-physicians in India. To overcome these barriers, organized patient education and awareness programs are urgently needed. Cardiological society of India (CSI), Association of Physicians of India (API) and

the Indian Medical Association (IMA) should join hands in these awareness programs. Such programs should not only use the traditional methods like public lectures, print materials, but should also focus on television, internet and social media. The public should be educated that for anyone beyond their teens, an ECG is a must for acute pain or discomfort from jaw to umbilicus including upper limbs. Public should be educated about the significance of time, seeking immediate medical attention and timely reaching the 'right' hospital or physician for STEMI care.

Another most important barrier is at the level of hospital systems. For a country like India, wherein only less than 10% of STEMI patients receive PPCI, primary PPCI cannot and will not be the answer for every patient of STEMI. We should rely on thrombolysis, especially bolus agents like Tenecteplase (TNK), and promptly shifting the patients to a PPCI capable centre. Considering the efficacy, a strategy of prehospital thrombolysis should be ideally suited for Indian conditions. Considering the diverse Indian conditions, a combination of strategies could be more appropriate. For instance, primary PPCI should be the preferred strategy in most of the hospitals, who are already offering 24 × 7 emergency PPCI services and the patient can reach the available STEMI Care PPCI capable centres less than 90 min.¹⁵ In case there is a delay in access to PPCI capable centre due to lack of transfer facility, densely populated cities, traffic congestions etc. Other cities and small district towns would have certified STEMI care physicians and hospitals. These hospitals should do the initial care, thrombolysis with TNK, management of complications and then should have an organized way of early transfer to nearby cities wherein early angiogram and PPCI are possible. For rest of rural India, prehospital thrombolysis with TNK could be the ideal strategy. For these to become practical, we need to have "Integrated STEMI Care Systems". We need to have emergency (108) ambulances, equipped with a facility to do an ECG and transmit to a central station, wherein a cardiologist can ascertain STEMI. Upon confirmation of STEMI, the patient should receive aspirin and statin. These ambulances should also have medical and paramedical personnel who can assess sickness, administer a questionnaire to assess the suitability for thrombolysis with TNK. The patient should be taken in the ambulance that has facility to monitor rhythm and defibrillator. Automated algorithms can decide, based on the place, distance to an STEMI hospital or a PPCI capable centre, whether to shift for primary PPCI or to a hospital for thrombolysis or pre-hospital thrombolysis in the ambulance itself. Accordingly the hospital should be activated and no time should be wasted at the hospital emergency. If pre-hospital thrombolysis is decided, the patient or relative may talk to a centrally stationed cardiologist and the medical personnel get a consent and administer the agent under cardiac monitoring inside the ambulance, while the patient is being shifted to a nearby hospital.

The above ambitious plan could only work if there is governmental participation and the STEMI care is integrated to the existing emergency care systems in India. The government should make emergency STEMI treatment at subsidized cost to all Indians, may be through medical insurance schemes. The Government should identify STEMI care centres in each city, district and rural areas and certify them. The information on the list of PPCI capable and other STEMI care

centres should be widely and easily available. Government should also ensure the availability of thrombolytic, especially bolus agents like TNK at subsidized cost to the poor. Recently published STREAM Trial 2014 with 1 year mortality follow up data has shown that PPCI less than 60 min is not practical in most of the STEMI patients, thus, TNK followed by PCI in 24 h is strongly recommended protocol.¹⁶

Therefore, Golden time window intervention of <2 h is most powerful predictor of salvaging jeopardized myocardium in STEMI and significantly reduce STEMI inflicted morbidity and mortality. If TNK is given in <60 min, it may reduce infarct size from larger to smaller, transmural to sub-endocardial or may even abort MI, thus help improving subsequent PCI outcome by reducing thrombus burden and better TIMI flow. Time delay >90 min reduce the benefit of PPCI. Thus the objective of Integrated TIMI Care is to minimize time from chest discomfort to ECG <30 min (FMC), ECG to drug intervention <60 min, drug intervention to PCI <90–120 min will definitely have STEMI inflicted morbidity and mortality benefit in our country to create global impact. We must act locally to impact globally.

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