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Review Article

Coronary Intervention in a Tertiary Care Centre in North Eastern India during Covid-19 Pandemic- Protocol and Management

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Abstract

Given the novel nature of COVID-19, there is currently no proven treatment beyond supportive care, but robust public health interventions have been introduced internationally to curtail disease transmission, minimize the burden on healthcare systems and protect vulnerable populations, including elderly people and those with existing medical comorbidities. Though coronavirus primarily affects respiratory system, cardiovascular complications such as myocarditis, acute coronary syndrome, exacerbations of heart failure and arrhythmia are not unknown. The general management of acute coronary syndromes (ACS) are well defined in AHA/ACC and European guidelines, but guidelines in the management of ACS in COVID-19 suspected or positive patients are scarce. At the same time, there is an urgent need to manage cardiovascular emergencies with appropriate standards of care and dedicated preventive measures. We present here the protocol dedicated to ACS patients adopted in our centre since March 13, 2020 and our initial experience in the management of ACS patients during the first 3 months of its implementation.

Keywords: COVID-19; Acute Coronary Syndromes (ACS)

Abbreviations

COVID-19: Corona Virus Disease 2019; ACS: Acute Coronary Syndrome; AHA: American Heart Association; ACC: American College of Cardiology; STEMI: ST elevated Myocardial Infarction; NSTEMI: Non ST elevated Myocardial Infarction; PCI: Percutaneous Coronary Intervention; ICCU: Intensive Coronary Care Unit; CSA: Chronic Stable Angina; CAD: Coronary Artery Disease; ACEI: Angiotensin Converting Enzyme Inhibitor; ARBs: Angiotensin Receptor Blockers; DAPT: Dual Antiplatelet Therapy

Introduction

On December 31, 2019, China announced several cases of atypical pneumonia in individuals affiliated with the Huanan Seafood Wholesale Market in Wuhan, Hubei Province which were later identified to be caused by the novel coronavirus [1]. Over the past few months, COVID-19 has grown into a worldwide pandemic, with over 9.8 million reported cases globally as of 25th June 2020. Given the novel nature of COVID-19, there is currently no proven treatment beyond supportive care, but robust public health interventions have been introduced internationally to curtail disease transmission, minimize the burden on healthcare systems and protect vulnerable populations, including elderly people and those with existing medical comorbidities. Though coronavirus primarily affects respiratory system, cardiovascular complications such as myocarditis, acute coronary syndrome, exacerbations of heart failure and

arrhythmia are not unknown. Ete T., *et al*. had proposed possible mechanisms of cardiovascular manifestations of COVID-19 [2]. Owing to the COVID 19 outbreak in North East India, a specific protocol has been proposed to manage the acute coronary syndrome (ACS) patients referring from the entire North East region.

COVID 19 and ACS

The general management of acute coronary syndromes are well defined in American Heart Association (AHA)/American College of Cardiology (ACC) and European guidelines ,but guidelines in the management of ACS in COVID-19 suspected or positive patients are scarce [3]. At the same time, there is an urgent need to manage cardiovascular emergencies, including ACS, with appropriate standards of care and dedicated preventive measures and pathways against the risk of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Due to the rapid spread of COVID-19 cases and the institute being the regional referral centre for all cardiovascular emergencies, the department of Cardiology made a specific protocol for triage and management of all cardiac emergencies. In particular, customized pathway was customised to allocate patients to the appropriate COVID-19 ward and to treat them according to ACS severity and the risk of suspected SARS-CoV-2 infection.

Protocol

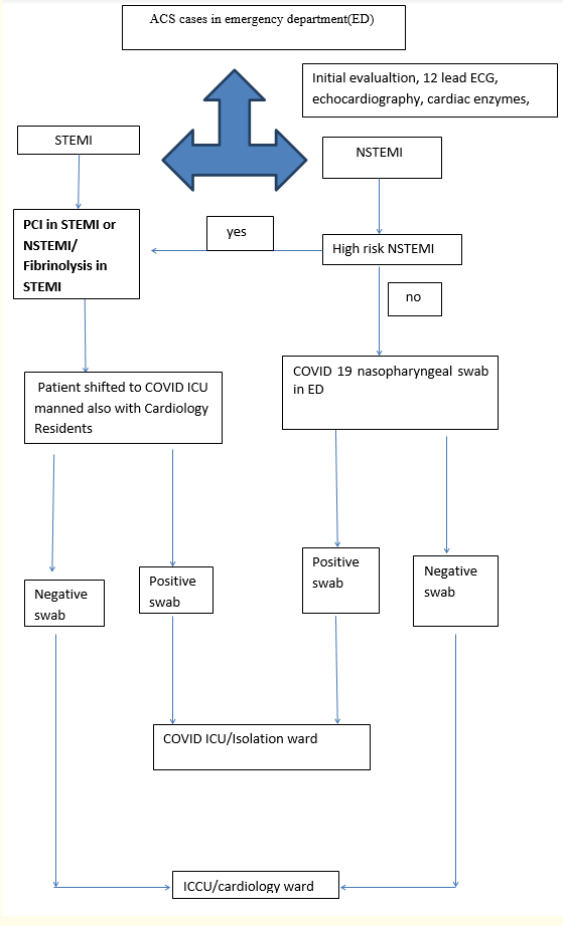
The primary objective of the protocol is to ensure the best treatment as per recent published international guidelines and also to ensure adequate in hospital safety of all healthcare personnel. The mandatory recommendations for health care personnel taking care of patients with confirmed, probable, or suspected SARS-CoV-2 infection included correct donning and doffing of PPE (gown, gloves, goggles/shields), limiting the number of people providing care to patients, changing scrubs between cases, maintaining social distancing inside the hospital, and changing civilian clothes and footwear on entering and leaving the hospital. Moreover, all patients are advised to wear a surgical mask throughout their hospitalization.

ST elevated myocardial infarction (STEMI)

The patients presenting with acute STEMI, are divided into two categories, those coming within window period (12 hours) and those out of window period. For those patients within window period, the first treatment option is primary percutaneous coronary intervention (PCI) with all appropriate protective measures. Those patients who are not affordable for the primary PCI, depending upon on the hemodynamic status, they are either admitted in COVID ICU (LEVEL C) or LEVEL B (COVID 19 suspects or stable COVID 19 patients) where fibrinolysis is performed unless contraindicated. At the same time irrespective of all suspected or probable cases COVID 19 throat swab for RT PCR tests is mandatory. After the reports are collected, covid 19 negative patients are shifted to Intensive Coronary Care unit (ICCU) and further management like elective coronary angiography and rescue PCI are planned accordingly.

NSTEMI and unstable angina

Patients with NSTEMI or unstable angina presenting with any hemodynamic, electrical instability or sudden cardiac arrest, PCI is performed immediately. If the patients are hemodynamically stable, they are managed in LEVEL B area with continuous monitoring. Once the throat swab result is found to be negative, these patients are further shifted to cardiology ward. Coronary angiography and possibly a PCI are performed within 24 hours in the catheterization laboratory. On the other hand, when the swab result is positive, the patient is admitted to dedicated COVID-19 ICU and invasive procedures are avoided unless the patient is hemodynamically stable. The main aim of the dedicated system is minimise the exposure between SARS-CoV-2 positive and negative patients.



Figure

Discussion

Epidemiology

During the pandemic of COVID 19, the actual prevalence of Coronary artery disease is difficult to determine. Because it varies from population to population, according various studies from China the prevalence rates ranges between 4.2 and 25 percent have been reported [4-6]. Among the COVID 19 patients those who were admitted in intensive care units, or those died, the prevalence rates are much more higher [7]. The frequency of myocardial injury (as reflected by elevation in cardiac troponin levels) is variable among hospitalized patients with COVID-19, with reported frequencies of 7 to 28 percent. Most of the studies showed that the major decline in diagnosis and delayed presentations of ACS upto 40 to 50 percent during the COVID-19 pandemic [8]. Patients with hypertension, diabetes, or cardiovascular disease are at high risk of being affected by COVID-19 and have more severe outcomes. Early COVID-19 case reports suggest that patients with underlying conditions are at higher risk for complications or mortality-up to 50% of hospitalized patients have a chronic medical illness (40% cardiovascular or cerebrovascular disease). In the largest published clinical cohort of COVID-19 to date, acute cardiac injury, shock, and arrhythmia were present in 7.2%, 8.7%, and 16.7% of patients, respectively [9] with higher prevalence amongst patients requiring intensive care.

COVID-19 and its role in ACS

The COVID-19 affects the heart in two ways:

1. SARS-CoV-2 viral invasion of cardiomyocytes and direct damage via this process, but this has not been proven in any pathology studies. Severe hypoxia from acute respiratory damage caused by the virus may result in oxidative stress and myocardial injury.

2. COVID-19 may cause cardiac injury indirectly due to an overwhelming immune inflammatory response and cytokine storm. These two processes which may also destabilise the atherosclerotic plaque and leads to myocardial ischemia (Type 1 Myocardial infarction) [10]. The patients with COVID 19 with high fever, hypoxia due to respiratory involvement may significantly increase cardiac output which may leads to mismatch between supply and demand (Type 2 MI).

Management issues with COVID 19 and angina patients

During the pandemic, the general approach and management to both chronic stable angina (CSA) and ACS patients should be considered as important. The most important thing is irrespective of ACS or CSA patients with unknown COVID-19 status are treated as potential COVID-19 patients since aerosolization during intubation or cardiopulmonary resuscitation in the emergency department (ED), catheterization laboratory and ICCU is possible.

The management of CSA patients during the COVID-19 pandemic is similar to those without COVID-19. The exception is to delay elective revascularization procedures in patients for whom the indication is relief of symptoms. Such an approach protects the patient and health care workers from potential viral exposure and spread. For patients who must have revascularization for reasons such as extremely poor quality of life or prolongation of life, as with significant left main CAD, test the patient for COVID-19 infection and appropriate revascularisation measures can be undertaken.

The management strategy of ACS patients should be determined by a) risk stratification and b) whether patient is confirmed COVID-19, suspected COVID-19 or low risk of COVID-19 [11]. In general, the total number of PCI procedures should be minimised in order to conserve healthcare resources and limit the risk of infection and its transmission among healthcare personnel. So, a conservative approach can be recommended for all ACS patients who are stable. Fibrinolysis may be considered as a reasonable option for stable STEMI patients presenting within stipulated time frame, without contra-indications as per standard protocols. Invasive interventions may be limited to STEMI and NSTEMI with hemodynamic instability [12].

Irrespective of the initial reperfusion strategy, treatment includes all STEMI patients with early aspirin, P2Y12 inhibitor, and anticoagulation. High-dose statin is started as soon as possible after the diagnosis. Angiotensin Converting Enzyme Inhibitor (ACEI)/Angiotensin Receptor Blockers (ARB) are usually used in post ACS setting. It is recommended to continue use of ACEI/ARB in the treatment of HTN, HF, post MI and other scenarios during COVID-19 pandemic although there is a debate regarding their use during this pandemic, as they increase the ACE-2 levels. Coagulation parameters are deranged during severe COVID infection, which need to kept in mind before giving thrombolysis or anti platelets. Close monitoring of bleeding parameters should be done in such situations [13]. However, the derangement of clotting parameters should not be a contraindication for the use of anticoagulants in patients with COVID-19 infection.

The number of patients undergoing elective Coronary angiography has reduced significantly during this pandemic in the institute due to factors related to lockdown, accessibility to health care fa-

cilities, restriction in transportation and reduction in the number of elective procedures. However, it has been found that the proportion/percentage of patients undergoing angioplasty after coronary angiography (taken in account the total number of cases) have increased relatively during this COVID-19 pandemic.

COVID 19 and DAPT

The patients with COVID 19 are most often suffer from diffuse alveolar haemorrhage (DAH) and life threatening disseminated intravascular coagulation (DIC). So, the dual anti platelet therapy (DAPT) and its duration after any percutaneous intervention remains an issue. The administration of aspirin therapy before hospitalisation, not during hospitalisation will be associated with lower risk of developing severe acute respiratory distress syndrome and mortality in patients with community-acquired pneumonia. The choice of P2Y12 inhibitors deserves consideration. All oral P2Y12 inhibitors reduce platelet-leukocyte aggregates and platelet-derived pro inflammatory cytokines fromα-granules, ticagrelor is unique in having the only well documented additional target of inhibition ENT1 (equilibrative nucleoside transporter-1), contributing to inhibition of cellular adenosine uptake. Therefore, ticagrelor confers more potent anti-inflammatory properties by inhibiting platelet P2Y12 receptor and ENT1. The platelet counts are also important, as advised by expert committee proactive measures or stopping antiplatelet therapy in patients with a platelet count < 100 000/μL or < 50 000/μL, respectively [14].

Among patients on DAPT, maintaining P2Y12 inhibitor mono therapy (preferably ticagrelor) may be scientifically reasonable for ≥ 3 months after PCI. DAPT should not be discontinued before 3 months after PCI [15].

Conclusion

We are in the midst of a pandemic of infecting more than 8.9 million people globally and causing nearly five lakhs deaths. This has overwhelmed the medical infrastructure worldwide and compelled to make modifications in the management of some commonly occurring diseases. A more conservative approach in the management of Acute coronary syndrome is mandated by certain compulsions. Robotic-PCI can provide an additional layer of protection to the healthcare personnel participating in the management of COVID patients. This may be especially useful in situations where access to PPE is limited, as in the current crisis. Follow up with telephonic or tele health care systems should be extended for all stable patients to minimize hospital visits and if possible avoid them.

Author Contributions

1) Conception or design of the work: Dr Tony Ete, Dr Animesh Mishra, Dr Arun Kumar.
2) Data collection: Dr Arun Kumar, Dr Tony Ete, Dr Amethyst Bamon.
3) Data analysis and interpretation- Dr Tony Ete, Dr Arun Kumar, Dr Amethyst Bamon, Dr Utpal Kumar, Dr Shakeel Ahamed Khan, Dr Vanlalmalsawmdawngliana Fanai, Dr Tejvir Grewal.
4) Drafting the article: Dr Arun Kumar, Dr Tony Ete, Dr Dr Vanlalmalsawmdawngliana Fanai, Dr Animesh Mishra, Dr Tejvir Grewal.
5) Critical revision of the article: Dr Animesh Mishra, Dr Tony Ete, Dr Vijay Noel Nongpiur.
6) Final approval of the version to be published: Dr Animesh Mishra, Dr Tony Ete, Dr Arun Kumar.

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