Effectiveness of Early Treatment of Acute Coronary Syndrome

Student Name

University

Course

Professor Name

Date

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Introduction

Acute coronary syndrome (ACS) is a manifestation of ischemic heart disease that is characterized by symptoms of acute myocardial ischemia. During a diagnosis, ACS consist of several clinical entities which include: ST-segment elevation myocardial infarction (STEMI), non-ST segment elevation myocardial infarction (NSTEMI), and unstable angina (UA). The acute myocardial ischemia commonly occurs as a rapture of coronary artery plaque resulting into thrombosis that cause complete or partial obstruction of the coronary artery.

Looking at the differentiations of the clinical entities of ACS, the blood sample of a patient with INSTEMI contain biomarkers of myocardial damage while one with UA lacks biomarkers in the bloodstream. On the other hand, a patient with STEMI has ACS with elevated ST within Electrocardiogram (ECG) and contain biomarkers of myocardial injury. Therefore, during pharmacologic treatment and rehabilitation of ACS, it is vital to distinguish patients who are suffering from STEMI from those with either UA or INSTEMI. In this paper, we are going to go through an overview of the effectiveness of early treatment and rehabilitation of patient with ACS and effect the treatment have on preventing and reducing morbidity and mortality.

Diagnosis of Acute Coronary Syndrome

There are several forms and types of ACS treatments with each differing depending on the type of clinical entity a patient is experiencing. To establish the type of treatment suitable, the diagnosis is carried out to ascertain and distinguish the type ACS. The distinction further influences the selection of pharmacotherapy to be used, timing and priorities for different patients experiencing ACS. An electrocardiogram (ECG) test and blood tests are the two primary tests an emergency room doctor perform on a patient with

ACS to distinguish the condition as an unstable angina or a heart attack. The ECG test uses electrodes to measure irregular impulses of the heart, with electrical signal showing location of blockage. The blood tests determine whether the death of cells in the blood has caused damage to the heart tissues.

Other tests can be performed to examine further about patient's ACS condition, which include Coronary angiogram, echocardiogram, myocardial perfusion, stress test, and computerized tomography (CT) angiogram test. Coronary angiogram test uses x-ray imaging to examine blood vessels in the heart. Another test is echocardiogram, which uses sound waves for heart imaging and determining heart pumping rate. Myocardial perfusion imaging uses radioactive substance to examine flow of blood through the heart muscle. A test carried out by computerized tomography (CT) angiogram detects blocked or narrowed coronary arteries seen inform of multiple 2-D slices taken using a specialized X-ray technology. The stress test helps in examining how the heart works when exercising and it is normally performed on patients who have no sign of ACS.

Effectiveness of Early Treatment of Acute Coronary Syndrome

The treatments of acute coronary syndrome entail groups of medication that involve decreasing of recurrent ischemic events, increasing survival rate, and provide symptomatic relief. Determining appropriate mode of treatment to ACS patients is influenced by several factors that involve critical decision making. Selection of medication and timing of STEMI patient differ from NSTEMI and UA patient. A STEMI patient requires timely reperfusion therapy within 120 minutes of the onset of first symptom. The reperfusion therapy can be either percutaneous coronary intervention (PCI) or fibrinolytic agent. Between the two reperfusion therapies, PCI is the appropriate for patients who have shown symptom of the condition within 12hrs. On the other hand, fibrinolysis is preferred to patients in the facility

incapable of performing PCI and should be performed within 30 minutes after diagnosis accompanied with anticoagulant for at least 48 hours.

The early treatment of NSTEMI or UA focuses on either early invasive strategy or medical management where patient is issued with antiplatelet, anti-ischemic, analgesic therapy or anticoagulant. All the treatments aim at preventing complications and minimizing ischemia in the process of deciding the appropriateness and timeliness of coronary angiography and revascularization strategy. Generally, the patient can undergo coronary angiography (early invasive strategy) within the first 48 hours of the onset symptom and then followed by either medical therapy or PCI. The coronary angiography is mainly preferred to patients exhibiting clinical signs such as hemodynamic instability, ischemia conditions such as arrhythmic and non-resolving chest, and has positive non-invasive testing. According to Petrovic & Chhabra, (2019), during the treatment of INSTEMI and UA, anticoagulant such fondaparinux and enoxaparin should not be used on patient with severe renal failure since they increase bleeding risks. However, during PCI treatment, enoxaparin was found to be effective in reducing bleeding and mortality of patients with STEMI.

Research conducted on the effectiveness of early invasive strategy on the patients with ACS has shown that it reduces mortality and non-fatal myocardial infarction (MI). Early invasive strategy is recommended for patients with NSTEMI and only performed in the absence contraindications. Research was conducted by Bavry et al, (2018) with an objective of determining whether early invasive therapy has an impact on survival improvement of patients with ACS and reduction on adverse cardiovascular activities in a span of two years. The team collected data from 8,375 NSTEMI patients who had gone through early invasive therapy and those who employed a more conservative approach.

The result showed a mortality rate of 4.9% in early invasive patients, which is lower than mortality rate of 6.5% on conservative group. Similarly, the incidence of non-fatal MI was lower in the early invasive group 7.6% compared to conservative group 9.1%. After 13 months, the risk ratio of early invasive group had reduced from 0.82 to 0.69 evidenced by reduction in rehospitalization of patients with unstable angina (Hulten et al, 2018). From the result, early invasive therapy is effective in improving long-term survival and reduces rehospitalization for those with unstable angina and late myocardial infarction on NSTEMI patients.

A meta-analysis research was also conducted by Hulten et al (2018) on the effect of early statin therapy on ACS patients. The research used 13 controlled trials from a total sample of 17963 adults. The result after 2 years of follow up shows that, just like early invasive therapy, administering early intensive statin therapy to ACS patients reduces the rate of death and other cardiovascular activities. From the survival curve, it shows that the effectiveness of the early, intensive statin therapy begins to be realized from 4 to 12 months, with full significant being realized after 12 months. This implies that early intensive statin therapy begins to be effective after 4 months of treatment.

Another treatment that has a massive effect on NSTEMI and UA patients is the use of antiplatelet agents. Antiplatelet agents that are commonly used are aspirin, P2, Y12 inhibitors, ticagrelor, prasugrel, and clopidogrel. A patient is issued with aspirin as the early antiplatelet agent after diagnosis has confirmed NSTEMI or UA or the patient is highly suspected of having ACS. The second dose of antiplatelet agent depends on whether the patient will undergo ischemia-guided strategy or the early invasive therapy. According to cervino et al (2019), the preferred second dose should be between prasugrel and ticagrelor. However, prasugrel is less efficient to patients above 75 years old since it increases the risk

of bleeding. In such a case clopidogrel is considered as the second dose of antiplatelet and preferred to a patient going through early invasive therapy.

A study on the benefits and risks of using both aspirin and clopidogrel in patients undertaking surgical revascularization for UA patient shows that the benefits of clopidogrel outweigh the risks. The study involved 12,562 patients who were randomly placed on either clopidogrel or placebo after the first dose of aspirin. The result shows the prevalence of stroke, MI, or cardiovascular (CV) death lower in patients on clopidogrel going through PCI compared to those on placebo. For PCI patients, stroke, MI, or cardiovascular (CV) death was at 9.6% for clopidogrel compared to 13.2% for placebo. The same was experienced on those undergoing coronary artery bypass grafting (CABG), with 14.4% for clopidogrel and 16% for placebo. However, during CABG, more patients on clopidogrel were subjected to life-threatening bleeding at 5.6% compared to placebo at 4.2%. According to Schwartz et al (2018), it is recommended to start clopidogrel upon admission including those who are to undergo CABG.

Effectiveness of Early Rehabilitation of ACS Patients

Rehabilitation of acute coronary syndrome involve recovery plan of a patient who have suffered from acute cardiac condition and is commonly referred to as cardiac rehabilitation. In the recent past, many people have died from ACS and it is important to consider all the possible options that will lead to quick recovery once an individual is diagnosed with the condition. During the recovery process, Cardiac rehabilitation plays a major role during the process of treatment. According to Bobby Stephenson, a cardiac rehab specialist, cardiac rehabilitation helps in improving the quality of life and reduce and manage cardiac symptoms, which in return lengthens the life of an ACS patient.

Cardiac rehabilitation is divided into four phases, which include phase I, phase II, phase III, and phase IV. Phase I is referred to as an acute phase since it involves recovering patient who is still in the hospital. This phase entails assessment, education, physical therapy, and discharge plan. The patient is assigned a cardiac rehabilitation specialist who visits him or her at the hospital to begin phase 1 rehabilitation sessions. Phase II refers to as subacute outpatient care and begins immediately after the patient is discharge. This phase involves monitoring recovery progress and reinforcing what was learnt in phase I through more extensive training. Phase III entails empowering the patient with tools that will help in managing heart condition on his or her own and help the patient live healthier, happier, and longer life (Gelinier & Bonin, 2017). Some of the tools include exercise program and education on nutrition, lifestyle, and stress management, Finally, the last session of cardiac rehabilitation is phase IV, which mainly involve continuous maintenance of lifestyle changes instigated in phase III.

Incorporating of the early cardiac rehabilitation program has proven to ACS patient has proven to be very effective in reducing morbidity and mortality within the first 12 months under ACS treatment. A meta-analysis research conducted by Ji et al (2019) on the effects of exercise-based cardiac rehabilitation shows that cardiac rehabilitation reduces cardiac mortality, repeated PCI, recurrence of MI, and restenosis. The result shows that hazard ratio of mortality was lower in the cardiac rehabilitation group compared to those who did not incorporate cardiac rehabilitation recovery program, with hazard ratio being -0.47 and confidence interval shifting from -0.56 to -0.39. In another instance, investigative research comparing the effectiveness between hospital based cardiac rehabilitation and social care based cardiac rehabilitation shows that a phase II social-care based cardiac rehabilitation improves efficacy and adherence compared to hospital-based cardiac rehabilitation program (Ji, 2019). The adherence rate for social care base was at 54% while hospital base at 53%.

Conclusion

The effectiveness of early treatment and early rehabilitation on patient suffering from acute coronary syndrome have shown tremendous improvement in reducing morbidity and mortality in the early stages of the disease. For instance, timely reperfusion therapy treatment is only effective in treatment of STEMI acute coronary syndrome patients but not NSTEMI and UA, and choosing between PCI reperfusion therapy and fibrinolysis reperfusion depends on timeliness of the diagnosis. When it come to treatment of NSTEMI and UA, dispensation of early invasive therapy and the use of antiplatelet agents has a long-term benefit of reducing mortality and morbidities associated with ACS. The same applies to early rehabilitation program on patient undergoing ACS treatment since cardiac rehabilitation aims at helping the patient to heal faster have healthy and longer life after developing ACS.

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