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Electroconvulsive therapy for depression following acute coronary syndromes: a concern for the anesthesiologist☆

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Abstract The prevalence of depression in patients with cardiovascular disease is higher than general population and especially following an acute coronary syndrome (ACS), a significant number of patients report a wide spectrum of behavioral and mood changes attributable to clinical depression. Treatment of depression following ACS event is particularly challenging since most of the therapeutic modalities are associated with increasing the systemic sympathetic tone from neurogenic or pharmacologic sources. Increased activity of the adrenergic and catecholamine activity may further deter the myocardial oxygen supply and demand therefore treating depression should be carefully evaluated for its risk benefit ratio. Electroconvulsive therapy (ECT) is recommended for patients with severe depression, in whom behavioral and pharmacologic treatments have failed. Patients who refuse to take medications or present with any psychological emergency such as harming self or others, are also candidates for ECT. ECT is also associated with sudden surges of catecholamines and may cause recurrent myocardial ischemia and fatal dysrhythmias in patients convalescing from an ACS event. Herein, we provide an overview and practical guidelines for management of patients presented for ECT following ACS.
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1. Introduction

Acute coronary syndromes (ACS) range from unstable angina to an acute ST-elevation myocardial infarction. Coronary artery disease is common health issue among adults during their 5th or 6th decade of life. Ischemic heart diseases secondary to a coronary atherosclerosis is the

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leading cause of death worldwide [1,2]. Even if they survive the initial attack, the patients generally experience a drastic change in their lifestyle pattern [3,4]. It is very common for a recovering patient from an acute coronary syndrome to cope with the new lifestyle. There is a general feeling that the patients will notice new changes or limitations in their daily activity level [5]. Although an endogenic chemical imbalance is the leading cause of major depressive disorder in adults, the role of exogenic factors in development of depression and anxiety can not be denied [1]. Patients frequently experience symptoms related to depression and severe anxiety following an acute coronary event [6–8]. Similar psychological changes are also reported following revascularization procedures of the coronary arteries either by percutaneous intervention or through surgical coronary artery bypass grafting [7,9,10].

The range of depression following an acute coronary event varies from mild anxiety related to the patient's uncertainty about his/her normal daily function to a panic state with a fear of impending sudden death [7]. Additionally, the emotional dependence to cardiovascular medication by itself may also create certain level of anxiety among these patients. Not to mention, several classes of medications that are used to control the heart rate and blood pressure may also result in the cerebral levels of catecholamines, which further contribute to clinical manifestations of depression among these patients. Depression associates with worse outcome in patients with coronary heart disease with more severe symptoms posing higher risk [11]. The American Heart Association recommends routine screening of patients with coronary heart disease for depression as effective depression treatment may improve health outcomes [12]. In a meta-analysis, 20% of patients with heart failure had depression. Patients with more advanced heart failure more frequently had depression and depression associated with adverse outcome and mortality over a period of time [13].

2. Treatment of depression in patients following an ACS event

Treatment of major depression is often necessary to improve well being of the patient following ACS [14]. Severe cases of depression often affect the medication compliance and their cooperation in completing rehabilitation programs that are recommended for patient recovery from an ACS event [15–18]. Additionally, most of the patients with mild and moderate symptoms of depression and anxiety have successfully responded to routine cardiac rehabilitation programs. The questionnaires that are completed by the patients and their family members indicate that there is generally a state of increased anxiety following ACS and coronary revascularization procedures such as percutaneous coronary intervention (PCI) and coronary artery bypass grafting surgery [19]. Several studies have reported a significant improvement in the psychological state of these patients after completion of 8-week cardiac rehabilitation programs using brief mood survey and Beck's Depression inventory-II [20,21].

Psychiatric consults are extremely beneficial and uniformly necessary in severe cases of depression especially in those who were treated for depression before the ACS event [22]. Several therapeutic strategies are recommended for patients with depressive symptoms, which range from behavioral biofeedback therapies, pharmacologic inhibitors of serotonin release or catecholamine reuptake and electroconvulsive therapy (ECT) [23]. This therapeutic spectrum does not necessarily take place in tandem, but ECT is generally preserved for patients in whom either biofeedback and pharmacological methods were ineffective or the patient's compliance with medication was less than optimal.

3. Electroconvulsive therapy

The generalized seizure activity is considered the crucial therapeutic element in treating symptoms related to severe depression refractory to pharmacologic therapy. Generalized sympathetic stimulation as it occurs in grand-mal seizure increases catecholamine levels in the central nervous system, thereby improving the clinical depressive symptoms [24,25]. Historically, epileptogenic stimulation such as insulin shock was used to produce a therapeutic seizure to treat severe depression. Interestingly this treatment modality was introduced following an accidental insulin overdose in a suicidal physician suffering from severe depression [26]. However, the convulsive treatment is now achieved by applying transcranial high-frequency electrical stimulation of brain.

ECT in its current form was first applied in 1938 for treatment of psychiatric illnesses; however, its clinical use was very limited due to a common social stigma. Since 1970, the clinical use of ECT has increased and there has been significant improvement in its safety and comfort measures. The most important improvement that has affected the overall acceptance of this treatment by the patients and their family members was the introduction of general anesthesia and the use of neuromuscular blockade. The use of neuromuscular blockade not only effectively ablated violent muscle contractions of the patients during treatment; it also practically eliminated the incidence of vertebral fractures (especially in osteoporotic patients) and serious injuries to the lips and the tongue that may have subsequently resulted in the loss of airways.

ECT is reserved for patients with refractory psychiatric illnesses, including major depression refractory to medication, schizophrenia, and patients with suicidal ideation. Patients typically undergo treatments several times per week, with decreasing frequency as symptoms improve. ECT is most helpful when it is administered in addition to oral antidepressants [27]. The procedure involves delivery of up