Neurological Outcome After Cardiopulmonary Resuscitation And Its Prediction

An Essay Submitted For Partial Fulfillment
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بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

﴿يُؤْتِي ٱلْحِكْمَةَ مَن يَشَآءُ ۚ وَمَن يُؤْتَ ٱلْحِكْمَةَ فَقَدْ أُوتِيَ خَيْرًا كَثِيرًا ۗ وَمَا يَذَّكَّرُ إِلَّآ أُو۟لُوا۟ ٱلْأَلْبَٰبِ﴾

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Sameh Shehat

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List of acronyms and abbreviations

AA	Arachidonic Acid.
ACD-CPR	Active Compression-Decompression CPR
ACLS	Advanced Cardiovascular Life Support
ACS	Acute Coronary Syndrome
AED	Automated External Defibrillator
AHA	American Heart Association
AMI	Acute Myocardial Infarction
ATP	Adenosine Tri phosphate.
BBB	Blood Brain Barrier.
BLS	Basic Life Support
CA	Cardiac Arrest.
CBF	Cerebral Blood Flow.
CBV	Cerebral Blood volume
CK	Creatine kinase
CMR	Cerebral Metabolic Rate.
$CMRO_2$	Cerebral Metabolic Rate of oxygen
CPR	Cardiopulmonary Resuscitation
CPP	Cerebral perfusion pressure
CSF	Cerebrospinal Fluid.
CT	Computed Tomography.
ECC	Emergency Cardiac Care
ECG	Electrocardiography
ED	Emergency Department
EEG	Electroencephalogram.
EMS	Emergency Medical Services
Fi O_2	Fraction of Inspired Oxygen
FFA`s	Free Fatty Acids.
GCS	Glasgow Coma Scale.
HCP	Health Care Providers
IAC	Interposed abdominal compression.
ICP	Intracranial pressure
ICU	Intensive care unite
IHCA	In-Hospital Cardiac Arrest

IHD	Ischemic heart disease
IM	Intra Muscular
IO	Intra Osseous
IV	Intra Venous
LDH	Lactate dehydrogenase
MAP	Mean Arterial Pressure.
MI	Myocardial infarction
MRI	Magnetic resonance imaging
NO	Nitric Oxide
NSE	Neuron specific enolase
$PaCO_2$	Partial Pressure of CO_2
PALS	Pediatric Advanced Life Support
PaO_2	Partial Pressure of Oxygen
PEA	Pulseless Electrical Activity
PE CO_2	Partial Pressure of Carbon Dioxide
PEEP	Positive End Expiratory Pressure
PTCA	Percutaneous Transluminal Coronary Angioplasty
ROSC	Return Of Spontaneous Circulation
SCA	Sudden Cardiac Arrest
$ScvO_2$	Central Venous Oxygen Saturation
SEP	Somatosensory evoked potential
SPO_2	Saturation of Peripheral Oxygen
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia

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Introduction

Introduction

With the advent of emergency medicine and improvements in the provision of emergency medical services, the number of patients who survive after cardiopulmonary arrest has increased. However, many of these survivors never regain consciousness and progress to persistent vegetative state while others made a remarkable neurological recovery despite a seemingly hopeless prognosis and long period of coma. Considerable researches have been carried out to identify those comatose patients who will recover sufficiently to live a meaningful life. A false prediction of bad outcome may cause the patient to be denied life-supporting treatment. On the other hand, a falsely optimistic prediction, although less serious from an ethical point of view, may lead to unnecessary prolongation of costly therapy. Therefore, an early estimation of severity of brain injury in comatose cardiac arrest survivors is required **(David et al, 2011)**.

Cardiopulmonary Resuscitation (CPR) is the first treatment for a person who has collapsed , has no pulse and has stopped breathing ; it is an emergency procedure consisting of external cardiac massage and artificial respiration along with using of certain drugs as an attempt to restore circulation of the blood and prevent death or brain damage due to lack of oxygen . So, it is a series of life–saving actions that improve the chance of survival following cardiac arrest (**Andrew et al., 2010**).

During the 50 years since the introduction of modern cardiopulmonary resuscitation and emergency cardiac care (ECC), there have been many advances for cardiac arrest victims. These interventions have restored the lives of many people when breathing has ceased and the heart has stopped. Resuscitation science continues to advance, and

clinical guidelines must be updated regularly to reflect these developments and advise healthcare providers on best practice **(David et al, 2011)**.

Successful resuscitation requires an integrated set of coordinated actions represented by the links in the chain of survival. The links include the following; immediate recognition of cardiac arrest, activation of the emergency response system, early CPR with an emphasis on chest compression, rapid defibrillation, effective advanced life support and integrated Post–cardiac arrest care (**Robert et al., 2010**).

The principle goal after successful resuscitation of cardiac arrest is not only to maintain the patient pulse and avoid a pulseless state, but also to prevent myocardial dysfunction and increase the likelihood of a good neurological outcome in the post-resuscitation period (**David et al, 2011**).