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RESEARCH ARTICLE

OUT OF HOSPITAL CARDIAC ARREST -- TIMELY INTERVENTION MAKES A DIFFERENCE

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ABSTRACT

Out of hospital cardiac arrest is quite common and in many a times it is under reported. Also often there is delay in seeking medical help and the outcome is not always positive. In this case report we want to mention about one such incident of out of hospital cardiac arrest in a young male and timely intervention and quick response from the emergency team lead to good final outcome.

Key words:

Sudden Cardiac Arrest, Cardiovascular deaths, OHCA (Out of Hospital Cardiac arrest), Resuscitation.

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INTRODUCTION

Sudden out of hospital cardiac arrest (OHCA) is the third leading cause of death in developed nation. In Europe more than 35000 patients are affected every year. And around 100,00 could be saved by proper resuscitation. In 2017 the American Heart Association (AHA) updated the estimated total annual out of hospital cardiac arrest 356,500. At least 23% of OHCA have VF/VT as the initial rhythm. More than 60% of cardiovascular deaths resulting from cardiac arrest, it remains the leading cause of death worldwide.

MATERIAL AND METHODS

For this case report, medical history from the resuscitation protocol of Emergency Medicine of Medica superspecialty hospital, Kolkata are used. The aim of this case report is to present a case of successful resuscitation at Emergency department of Medica Superspeciality Hospital, Kolkata.

CASE REPORT

A 31-year-old young man was brought to emergency department at this hospital in unresponsive state at around 6:30pm. The patient had been in usual health with no known co-morbidities, until approximately around 6.30pm evening he was brought to emergency

by his fiancée in an unresponsive state. As per his fiancée patient was apparently normal they were having an evening walk around 5.30pm, suddenly he collapsed on ground and became unresponsive. Immediately the bystander rushed to the Emergency Department.

On presentation to the Emergency department

Airway :- compromised - maintained by head tilt and chin lift.

Breathing:- patient having no spontaneous breathing, no chest movement, SpO₂- no tracing in monitor.

Circulation :- carotid pulse absent(checked for 8 seconds)

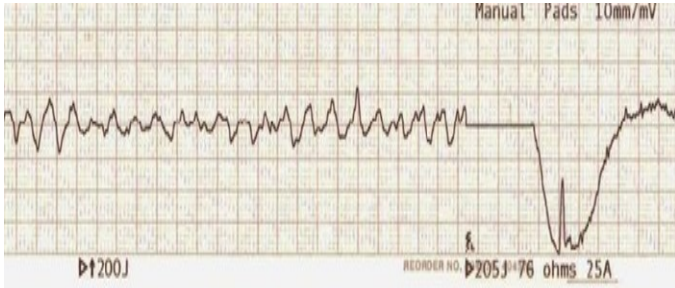
Disability :- E¹V¹M¹, blood glucose- 88mg/dl, unconscious and unresponsive. Pupil fixed and non reactive.

Extremity :- cold and clammy and no signs of any external injury seen.

Immediate intervention done in ED.(6:35pm)

1. CPR started at a rate of 30:2 with a rate of at least 120 compression/minute
2. Breaths in between the compression given by Ambu Bag connected to the wall mount oxygen supply.

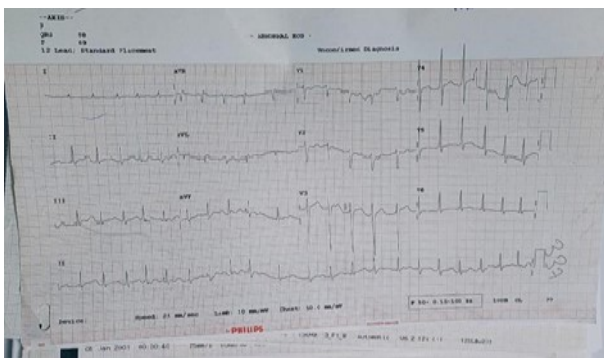
3. The emergency resuscitation team successfully established 2 large bore iv cannula in the cubital vein.
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 5. The patient was hooked to the Defibrillator and the rhythm analyzed.
- ↓
6. Cardiac defibrillator showed initial rhythm Ventricular fibrillation (fig01)



ABL800 BASIC MEDICA SUPERSPECIALITY HE Syringe - 5 195uL		07:02 PM	6/25/2022
PATIENT REPORT		Sample #	95652
Identifications			
Patient ID	45222UNKNOW		
Patient Last Name	UNKNOWN		
Patient First Name	UNKNOWN		
Sample type	Arterial		
T	37.0 °C		
Blood Gas Values			
pH	7.031		[7.350 - 7.450]
pCO ₂	36.6	mmHg	[35.0 - 45.0]
pO ₂	263	mmHg	[80.0 - 100]
Oximetry Values			
ctHb	16.8	g/dL	[13.5 - 17.5]
so ₂	98.0	%	[95.0 - 99.0]
Electrolyte Values			
cK ⁺	3.6	mmol/L	[3.5 - 5.5]
cNa ⁺	142	mmol/L	[135 - 145]
cCa ²⁺	1.01	mmol/L	[1.10 - 1.29]
cCl ⁻	113	mmol/L	[98 - 108]
Temperature Corrected Values			
pH(T)	7.031		
pCO ₂ (T)	36.6	mmHg	
pO ₂ (T)	263	mmHg	
Acid Base Status			
cBase Ecftc	-19.4	mmol/L	
cHCO ₃ (P.M)c	9.7	mmol/L	
Notes			
↑	Value(s) above reference range		
↓	Value(s) below reference range		
(Calculated value(s)		

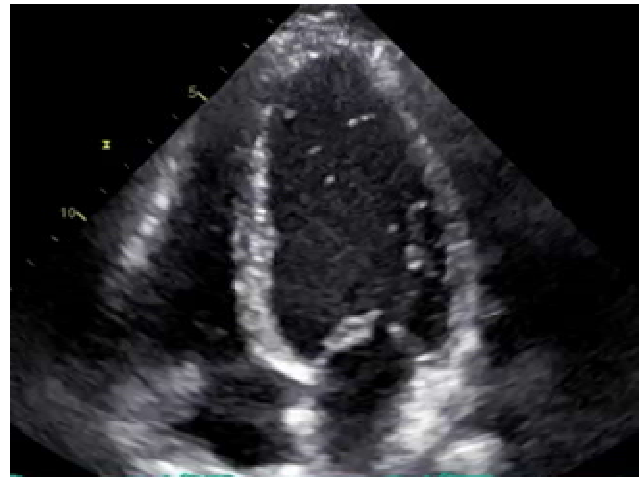
Immediate measures of Advanced cardiac life support, cardiopulmonary resuscitation, advanced airway interventions were started simultaneously by the resuscitation team. Patient airway is opened by head tilt and chin lift and then breathing done by BMV with 100% Fio₂ @ 15lit/m started and immediately DC shock 200J given, and CRP continued. After 2 minutes of good quality CPR the rhythm was analyzed and it still showed shock-able rhythm of Ventricular Fibrillation. A second shock of 200J was given and the CPR was resumed with changing of roles among the compressor and the airway members. Resuscitation measure continued, and Adrenaline 1mg administered in a 1:10000 dilution. As the chest rise during the BMV was not very significant the decision to consider advanced airway was taken and then the patient was successfully intubated in a single attempt without interfering with compression . Patient intubated with 8.0 ET tube and fixed at 24 at the angle of the mouth and position confirmed by 5 points auscultation and visualization of good bilateral chest rise by AMBU ventilation (crash intubation). Subsequently ventilation was continued at a rate of 1 breath every 4 seconds (15 breath /minute).

After 2minutes of 30:2 CPR cycle, rhythm checked and it was VF. A third 200J DC shock given followed by resumption of CPR. After another 2 minutes of CPR the rhythm was checked and the monitor showed an organized rhythm. The carotid pulse was checked and there was a palpable feeble carotid pulse. The patient who was still hooked to the defibrillator showed sinus rhythm with a rate of 160bpm. The ROSC was achieved and the Blood pressure was checked and it showed 80/60mmhg. 1000 ml of fluid bolus was given and subsequently the blood pressure was checked which showed 140/80 mmhg. The patient continued to remain unresponsive GCS-E1VTM1 , blood pressure-140/80, saturation-100% with 90% fio₂, pupils are reactive to light and a size of 2mm ,12lead ECG showed sinus tachycardia with an irregular rhythm(fig02).



The ABG drawn during resuscitation before crash intubation showed severe metabolic acidosis (fig03).

A bed side echo was performed showed dilated left ventricle EF -30-40% (approx), ivc -2.8cm



On taking the detailed history from the accompanying person, we came to know that patient is a chronic alcoholic and used to consume marijuana regularly.

Past medical history:- Nothing exactly was known to the accompanying person.

Past Surgical history:- Nothing significant.

Medication history:- Methotrexate for last 4months (reason unknown accompanying person). Tab. Sertraline for mood disorder.

Disposition

Patient was shifted to cardiac ICCU, and was started on inotrope support.

Lab value:- TLC -21360 , BNP-14687, D-Dimer-1410.79, CK NAC-419 , Troponin.I- 1.270 , Creatinine-0.60.

2D echo:- Severe LV dysfunction with grade one diastolic dysfunction EF-25%.

MRI Brain:- Normal study.

Eventually patient extubated on day 3rd and under went coronary angiography which came out to be normal study. Patient has been advised for AICD placement to prevent risk of second attack. The patient discharged in a stable condition.

Follow up:- The patient came down to our emergency department with his whole family after about a week to thank us for saving his life.

DISCUSSION

Out of hospital Sudden cardiac arrest is the leading cause of death worldwide.¹ In the young, however, deaths due to cardiovascular disease are much less frequent than deaths due to other causes such as unintentional injury, suicide and homicide.² Nevertheless, over 20 000 young individuals aged under 45 die due to cardiovascular disease in the USA each year.³ The subgroup of young cardiovascular deaths that occur suddenly has a particularly profound effect on the individual's family and local community. Screening of asymptomatic individuals for cardiac conditions, such as cardiomyopathies and channelopathies, has been proposed as a strategy to reduce the incidence of sudden cardiac death in young people. The best evidence that such a strategy might be effective comes from a single Italian before-after study that reported a decreased incidence of sudden cardiac death in athletes following the introduction of a mandatory athlete screening programme.⁴ In view of the limitations of the current evidence, screening of young asymptomatic non-athletes is not presently supported by either the American Heart Association or European Society of Cardiology (AHA/ESC).⁵⁻⁷

The most common cause of sudden cardiac death in young include Myocarditis accounted for 10%, Cardiomyopathy (not specified), dilated cardiomyopathy, and aortic dissection accounted for 5% of cases each, while cardiomegaly and hypertrophic cardiomyopathy accounted for 4% of cases each.¹³ The incidence of SCD and specifically CAD-related SCD (Sudden cardiac deaths) was significantly higher in nonmetropolitan areas compared with metropolitan areas; and increasing BMI was associated with increased likelihood of SCD related to cardiomegaly or dilated cardiomyopathy compared with other causes of SCD in the young. Of note, rates of bystander cardiopulmonary resuscitation in out-of-hospital arrest are higher in regional compared with urban settings.¹³ The complex interplay between these various factors challenges any one risk reduction strategy. Regional differences are not limited to heart disease but also apply to other disease states including diabetes mellitus where mortality is higher with increasing remoteness. Quick response from bystander and structured EMS system and capacity to perform BLS can make a significant difference in final outcome for out of hospital cardiac arrest. As the prevalence of overweight and obese individuals continues to increase, the recognition and further understanding of this pathology and yet undefined mechanisms could have important implications for informing families and the wider community of the burden of obesity even at a young age.¹⁴ Sudden cardiac death is the swift and unexpected ending of all heart activity. Breathing and blood flow stop right away. Within seconds, the person becomes unconscious and dies. Sudden cardiac death isn't the same as sudden cardiac arrest (SCA). SCA is the sudden loss of heart activity due to an irregular heart rhythm.

Survival is possible with fast, appropriate medical care. Sudden cardiac death in seemingly healthy people under age 35 is rare. It's more common in males than in females. When sudden death occurs in adolescents and young adults, it's sometimes due to undiagnosed heart conditions such as a genetic heart disease. The undetected heart problem may cause a young person to suddenly die during physical activity, such as playing competitive sports. However, sometimes sudden cardiac death can occur without exertion¹⁵. Sudden cardiac death is often caused by faulty electrical signaling in the heart. A very fast heartbeat causes the lower heart chambers (ventricles) to tremble uselessly instead of systole and diastole. This irregular heart rhythm is called ventricular fibrillation. Any condition that puts a strain on the heart or damages heart tissue can increase the risk of sudden death. Some conditions that can lead to sudden cardiac death in young people are⁸

Thickened heart muscle (hypertrophic cardiomyopathy). Heart rhythm disorders like Long QT syndrome is a heart rhythm condition that can cause fast, chaotic heartbeats. Other heart rhythm disorders that can cause sudden cardiac death include Brugada syndrome and Wolfe-Parkinson-White syndrome. Blunt chest injury like a hard hit to the chest that causes sudden cardiac death is called commotio cordis. Heart structure problem present at birth (congenital heart defect). Some people are born with changes in the heart and blood vessels that can reduce blood flow and leading to sudden cardiac arrest and death.

CONCLUSION

Depending on the underlying condition, medication or surgery may be recommended to reduce the risk of sudden death. For example, a medical device called an implantable cardioverter-defibrillator (ICD) may be implanted in the chest to continuously monitor the heart's rhythm. If a life-threatening heart rhythm problem occurs, the ICD delivers electrical shocks to reset the heart. Many athletic training centers have a device called an automated external defibrillator (AED) that is readily available to use. An AED is a portable device used to treat someone during cardiac arrest. An AED delivers shocks to reset the heart.¹⁶ Sudden cardiac arrest is a life-threatening condition in which the heart comes to a standstill. The heart isn't pumping blood anymore. Within minutes, this puts all organs and whole body at risk of death.

They must constantly receive oxygen which is delivered by the circulating blood. But when heart comes to standstill or it is fibrillating then there is no cardiac output and hence all the organs mainly the brain, heart muscle and kidney all gets jeopardized. Emergency treatment includes cardiopulmonary resuscitation (CPR) and defibrillation. CPR keeps enough oxygen in lungs and gets it to brain until an electric shock restores a normal heart rhythm. CPR and defibrillators may save your life. In the case report mentioned here, there was a positive outcome as the young male patient got the immediate attention in the Emergency room of our Hospital as incident happened just a walking distance from the hospital. So to emphasise more on this, it is very important to develop BLS and community outreach programme for people to attend to medical emergency like sudden cardiac arrest in young and above all the importance of recognizing a cardiac arrest and to act accordingly.

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