Introduction:

Drowning is defined as a process of experiencing respiratory impairment from submersion or immersion in the liquid (WHO, 2002) (1). Worldwide it is a very common occurance but literature are very scarce from Indian subcontinent. Understanding the pathophysiology and the management protocol is of paramount importance in resuscitation of drowning victims. Here we present such a case of near drowning alongwith the management.

Case Report:

Our patient , a 55 years old male attended the emergency room (ER) with a history of drowning on the same day in a pond near his house. On presentation he was in a restless and altered state, with breathing difficulty and stridor. On examination, the patient was found to have tachycardia with tachypnoea with an oxygen saturation of 48% in room air. He had a low Glasgow Coma Score (GCS) of 9/15. His chest auscultation revealed bilateral crepitations. Arterial blood gas analysis was done and it showed hypoxia. The patient was intubated and put on mechanical ventilation; thereafter was shifted to ICU. On further evaluation, his CT Scan of thorax showed bilateral aspiration pneumonitis. Gradually the patient developed hypotension and went into sepsis. He was put on ionotropic support and appropriate antibiotics. Patient developed features of adult respiratory distress syndrome (ARDS) with high FiO2 and high PEEP. With this management the patient responded and was gradually weaned off from ventillatory support. He was later shifted out of Intensive Care Unit (ICU).

Discussion:

Earlier drowning was classified as near drowning, wet/dry, active/passive, secondary and silent, but was discarded because they were confusing and hindered classification and management. The UTSTEIN approach simplified the classification of drowning outcomes into three main domains- death, morbidity and no morbidity (1).

The key risk factors for drowning are male sex, age less than 14 years, alcohol use, low income, poor education, rural residency, aquatic exposure, risky behaviour and lack of supervision (2).

The process begins with respiratory impairment as the person’s airway goes below

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the surface of the liquid (submersion) or water splashes over the face (immersion). Initially the water enters the oropharynx and is cleared. If clearance is not possible, conscious breath holding ensues. Eventually the internal drive to inspire becomes insurmountable and fluid enters the airway stimulating cough or laryngospasm (3). If the process continues number of events may occur such as fluid and electrolyte shifts, alveolar dysfunction and hypoxia (3). Depending upon the degree of hypoxia and resultant acidotic change in acid base balance, patient may develop myocardial dysfunction, electrical instability , cardiac arrest and CNS ischaemia. If the person is rescued alive, the clinical picture is determined predominantly by the amount of water aspirated and its effect.

Aspiration of salt water and fresh water causes similar degree of injuries although with differences in osmotic gradient. The effect of osmotic gradient causes disruption of the integrity of the alveolar capillary membrane with increased permeability, exacerbation of fluid and plasma and electrolyte shifts.

Cold water submersion was previously considered neuro-protective because of decreased metabolic demand of hypothermia. However, it has been determined that water temperature has no co-relation with overall outcome (4). Pneumonia is a rare consequence of submersion and is seen more often in submersion in stagnant warm and fresh water.

Victim may be asymptomatic , symptomatic or in cardio-pulmonary arrest. Symptomatic patients may exhibits altered vitals, anxiety, tachypnoea, dyspnoea or hypoxia, cough ,wheezing, hypothermia and vomiting. ARDS from altered surfactant effect and neurogenic pulmonary edema often complicate management.

Attention to airway , breathing and circulation is paramount as any cardiac arrhythmias are almost exclusively secondary to hypoxia. Patient with a low GCS should be intubated and given ventillatory support. Arterial blood gas level should be obtained in all patients with history of submersion. Complete blood count, blood glucose, electrolyte levels, lactate level, coagulation profile, kidney function tests should be done. Chest x- ray may detect evidence of aspiration, pulmonary oedema or segmental atelectasis. Elctro cardiogram(ECG) may detect significant tachycardia, bradycardia or underlying cardiac disorder. Arterial and venous catheters may be useful in monitoring cardiac output and related haemodynamic parameters.

Intubation and PEEP with mechanical ventilation in patient with poor respiratory

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effort, altered sensorium, severe hypoxemia, severe acidosis should be done. Ventillatory guidelines for ARDS should be followed.

In ER patient should be properly assessed. Early use of intubation and PEEP, CPAP/ BIPAP in awake, co-operative and less hypoxic individual is warranted. Appropriate treatment of volume depletion and acidosis should be done. Overall treatment goals are aimed at normalization of blood pressure, maintaining organ perfusion and facilitating gas exchange.

Conclusion:

Every drowning signals the failure of most effective intervention, namely prevention. It is estimated that more than 85% of drowning can be prevented by supervision, swimming instructions, technology regulation and public education. Timely management with ventilator support and other supportive measures can save lots of lives.

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