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Diagnosis of Brain Death and Management of Brain Death Organ Donor

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Introduction

The severe shortage of organs has put extreme pressure on the intensive care to proactively diagnose brain death and manage such patients optimally so that precious organs could be optimally transplanted into a deserving individual.

For the diagnosis of brain death 3 important caveats have to be fulfilled which includes:

1. Establishment of proximate cause of coma and that the state is irreversible

2. Achieving normal to near normal vitals (temperature and blood pressure)

3. A full neurological examination establishing

a) The absence of brain stem reflexes

b) Proving the presence of state of unaraousable unresponsiveness (coma)

c) Proving the absence of apnea even after challenging the respiratory system.

Ancillary test like ECG, CT angiography, Nuclear scans etc. are used in cases there are discrepancies in the clinical examination and at times when the diagnosis needs to be established quickly.

Establishment of Proximate Cause of Coma and that the State is Irreversible

The cause of the state of the patient should be finite. For the purpose of this, the patient should have corroborating laboratory investigation, examination findings and imaging results. For example in the case of intra-cerebral bleed the CT of the brain should show the presence of large intra-cerebral bleed for which no surgery can be offered for meaningful improvement, or in case of poisoning the level of the poison should be established.

Achieving Normal to Near Normal Vitals (Temperature and Blood Pressure)

Before one proceeds for the comprehensive neurological examination the healthcare provider has to ensure that the patient is at a normal core temperature and blood pressure is above 100 systolic.

Full Neurological Examination

Before performance of a neurological examination it is important to ensure that there are no confounders like paralytic agents or sedative drugs in the system as these would preclude an optimal neurological examination. This examination should establish the absence of pupillary reflexes, corneal reflexes, absence of the vestibular cochlear reflexes (dolls eye movement), absence of cough or gag to stimulus, absence of response to nail bed pressure or supraorbital pressure.

At this stage after normalizing the partial pressure of carbon dioxide the ventilator is disconnected and the CO_2 is allowed to build up. Even after build-up of CO_2 if the respiratory attempts do not start then the patient is declared to have suffered brain death.

In the instance that any of these are equivocal or in the event that any of these tests cannot be performed, ancillary tests like the EEG, CT angiography etc. needs to be performed as per resources and expertise keeping in mind the various false positives and false negatives involved.

Management of brain dead organ donor

The retrieval of satisfactory organs (for transplantation) depends on the optimal management of brain dead organ donor.

For the optimal management of a brain dead organ donor the minimum monitoring requirement would include an arterial line, central line, $EtCO_2$ monitor, $SPCO_2$ monitor, a foleys catheter, continuous ECG monitor and a core body temperature monitoring and point of care glucose monitoring to keep it below 200 mg/dl.

Maintenance of vital parameters to near normal is the norm for management of these patients.

These patient are known to develop hypotension quickly due to the presence of a) absolute hypovolemia due to diabetes insipidus which is commonly seen in these patients b) myocardial dysfunction and c) neurogenic shock. Judicious fluid replacement is the norm in these cases as fluid overload can cause graft failure in certain organs like liver and lungs. Also it is very important to use vasopressors and inotropes judiciously as the excessive use is associated with graft dysfunction and it is highly probable that the retrieved organs would be suboptimal.

The patient should be ventilated with a strategy that does not cause lung injury and hence maintenance of plateau pressure under thirty is important. Peep should be used to maintain satisfactory oxygenation (> 93% at least) and prevent atelectasis [1,2]. Presence of diabetes insipidus (suggested by > 4 ml/kg.hr urine output) should trigger immediate management in form of fluid replacement and possible use of desmopressin to reduce the urine output thus preventing hypovolemia, massive electrolyte shifts. Inspite of the above if hemodynamic embarrassment ensues, the use of triple hormone therapy mainly steroid, thyroid hormone and vasopressin can be thought of as an option [3].

As in management of Sepsis,Vap etc. the concept of bundled care in the management of brain dead organ donors may help in protocolising optimal care thus ensuring retrieval of optimal organs.

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