



A Decade Experience in Brain Dead Maintenance unit 'A Stanlean Soujourn'

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Abstract

Brain death diagnosis, certification and maintenance of potential organ donors had always courted confusion, ambiguity and controversy. But with more than 5 million people with end organ failure awaiting organ donation in India, this area of medicine and critical care which remained grey for a long period, became largely debated and discussed in recent times. While many facts had been made clear, some confusions and controversies still exists. In this article we look back on our journey of almost a decade with more than 60 cases of brain dead donors. we share our difficulties be it clinical, logistical or legal and how we managed critical issues in various aspects of brain death certification and donor management and how in the process devised our institutional protocol

Keywords: brain death, apnoea test, RADOPS protocol, T4 protocol.

Introduction

The department of surgical gastroenterology and institute of liver transplantation at the prestigious Government Stanley medical college has an unique distinction of having the first and one of its kind THE CADAVER MAINTAINENCE UNIT which has been functioning successfully since 2009. This unit is manned by eight anesthesiologists who are committed to its cause. Our unit has successfully maintained 60 brain dead donors and harvested around 600 organs over the last 9 years.

The number of patients with end organ failure requiring organ transplantation skyrocketed during the last decade. This is mainly attributable to metabolic syndromes like obesity & diabetes becoming national pandemics and social causes like

alcohol and substance abuse showing steep rise. Though the TRANSPLANTATION OF HUMAN ORGANS ACT [THOA] was passed in the year 1994, it was the year 2008 which saw the government of tamilnadu taking a giant step in to the future of brain dead donor maintainence & organ transplantation with the vision of

- a) Maximum utilisation of organs from brain dead donors by making the process of brain death certification more practical and feasible
- b) Making organ transplantation accessible for the needy and deserving patients by creating necessary infrastructure at public sector hospitals

- c) Increasing public awareness about drain death & organ donation to ensure more notification of suspected brain dead donors & organ donations, all these efforts converged in to the birth of THE CADAVER MAINTAINENCE UNIT.

The Challenge

As with any nascent unit, our unit too had its fair share of challenges. These challenges were from two mainly sections namely,

- a) Challenged in the process of brain death confirmation, certification & consent from donor families
- b) Challenges in organ donor management to maintain organ perfusion.

But as its said , all challenges comes with a reward in hand, it were these challenges that has helped us to metamorphose in to a successful, efficient and a closely knit team

The Emotional Relatives

Brain Death Certification is by itself a very sensitive process, where in we need to declare a person as brain dead even though he may have normal sinus rhythm on ECG and stsble vitals on the monitor. This needs a lot of convincing both on the part of the certifying physician and the relatives. But a lot of this dilemma was put to rest, thanks to the GO M.S NO 75 which made the process of apnea testing simplified yet very confirmative. This has allayed a lot of anxiety on the part of the anesthesiologist. For a grieving relative be a parent or partner the news of their loved ones demise is indeed a devastating one more so if we are going to bring in the concept of ORGAN DONATION. This requires a lot of patience from the doctor. During our early days of cadaver maintainence, we had many instances where we had to face angry, suspecting and restless relatives sometimes even amounting to assault.

On the other hand confusing clinical signs may complicate the scenario

- 1) **Abdominal aortic pulsations may** mimic spontaneous breathing movements leading to a false negative apnoea test

- 2) **Lazarus sign:** non specific reflex movements in brain dead patients mimicking actual limb movements are few examples, the anesthesiologist performing the apnea test must be aware of these scenarios so as to avoid unnecessary delay & confusion which may ultimately cause loss of precious organs

As time passed by we became more practical and perhaps learned from our experiences and developed a working process in cadaver maintainence namely

“TEAMS”

- **T** – TEST, examine the suspected donor & perform apnea test
- **E** – Explain the anxious relatives that their beloved is brain dead even though he may be hemodynamically stable, and brain death will be confirmed after second apnoea
- **A** -Allow time for the grieving relatives to mellow down & think about organ donation
- **M**- maintain hemodynamic stability, hormonal resuscitation , sepsis control and ultimately organ viability
- **S**- Shift , in the event of relatives consenting for organ donation, the donor is shifted to cadaver maintainence unit, in our specially designed donor transportation ambulance with all necessary resuscitation equipments

This is followed by the second apnea test and harvesting of organs which are allocated to hospitals as per a rota maintained by TRANSTAN. Organs are allotted to patients as per a transparent waiting list which can be accessed thro the official website of TNOS.

Over a period of time with team integrity & strict adherence to working process (TEAMS) we were able to slowly tide over the difficulties and have achieved almost 100% conversion rate in brain dead donors. Of the 60 odd donors we maintained & harvested in our unit a few require special mention

The Youngest Donor: A five year old, only son to loving parents, sustained severe head injury due to RTA & was declared brain dead. Though we too were emotional, we stuck to the working process and put the ball in their coat. And to everyones

surprise, the parents generously consented for organ donation making him the youngest donor and an immortal child.

A Relative From Third Sex: A fifty year old male, diagnosed as brain dead due to RTA, after the second apnea test, all relatives were against organ donation. But in a twist of events, his son who had left their home years ago returned as third sex person. He took the herculean task of convincing the stubborn relatives to donate his fathers organs and a positive difference in his fathers death and in the life of 8 deserving patients.

The Suspected 'Donor' Who Walked Out If The Hospital: IN a rarest case this patient who was clinically suspected to be brain dead, showed spontaneous respiration during apnea testing, the was declared negative. On further stabilisation and supportive management, his CNS features improved, he was put on percutaneous tracheostomy, gradually weaned from ventilator & walked out of the hospital, literally !!!

Donor Maintenance

A brain dead donor is very fragile and is maintained very meticulously as a critically ill patient. The supreme goal in donor management is to maintain perfusion which in turn is essential for organ viability which ensures better graft survival in the recipient. This vast and most important domain of organ donation is done in a system wise management

- 1) Hemodynamic management
- 2) Ventilator management
- 3) Thermoregulation
- 4) Acid base and electrolyte correction
- 5) Hormone replacement therapy
- 6) Sepsis control

The donor maintenance may extend to variable periods ranging from 6 hrs to as many as 3 days. During this period it is the utmost responsibility of the donor maintenance team to maintain perfect homeostasis, so that adequate organ perfusion and later graft survival is ensured.

Rules of 100's

Maintain SYSTOLIC BP > 100mmHG
HEART RATE < 100 BPM
URINE OUTPUT > 100ml/hr
PaO₂ > 100mmHg

The following criteria may be used as a guide to adequate optimisation:

- 1) To maintain a mean arterial pressure of > 60 mm hg
- 2) A central venous pressure of < 12 mm hg
- 3) SVR 800 – 1200 DYNES.SEC. M
- 4) Cardiac index > 2.5 l/mim/ m²
- 5) Peak airway pressure < 30 mm hg
- 6) An optimal ph of 7.30 – 7.45 is advisable as acidosis may have deleterious effect on graft function
- 7) A serum Na level of < 150 meq/ l as higher sodium concentrations have been associated with poor graft survival.
- 8) To maintain an haemoglobin of > 10 gms %, this may be achieved with packed cell transfusion.
- 9) An INR of < 1.5
- 10) Normothermia

Certain specific situations may be encountered during donor maintenance which may be a real test for the clinical acumen of the anesthesiologist, which include :

- a) **Central diabetes insipidus:** patient may produce copious amounts of dilute urine, sometimes up to 1.5 litres/hr causing severe volume depletion. This is managed by aggressive volume resuscitation through a wide bore central venous canula. Some cases may require desmopressin nasal spray or alternately inj.vasopressin at 1 u / hr
- b) **Hypernatremia:** causes a negative impact on graft function. It is managed with 5% dextrose replacement with insulin to titrate glucose levels
- c) **Euthyroid sick syndrome:** occurs in brain death due to inhibition of mitochondrial function. hormonal resuscitation with thyroxine helps in preserving organ function

d) **Hemodynamic instability:** though this can be easily managed with judicious use of inotropes, there is always an apprehension on the part of our surgical colleagues as high inotropes may hamper organ perfusion. But in our experience we have noticed that even donors with high inotropic supports had good organ function. However it is better if dopamine is kept $< 10 \text{ mcg / kg / hr}$ and phenylephrine is better avoided as it causes splanchnic vasoconstriction

Based on our learning curve of 60 cases in brain dead organ donor management we have formulated our protocol which is the RADOPS protocol

Revised Aggressive Donor Optimisation Protocol by Stanley

- 1) INJ.MEROPENAM 1 GM IV TDS
- 2) INJ.TARGOCID 200 MG IV OD
- 3) INJ.FLUCONAZOLE 200 MG IV OD
- 4) INJ.METHYL PREDNISOLONE 1 GM IV STAT
- 5) INJ.NORADRENALINE @ $0.02 \text{ Mcg / KG / MIN}$
- 6) INJ. VASOPRESSIN @ 1 U / HR (if required)
- 7) 5 % dextrose @ $150 -200 \text{ ML / HR}$
- 8) INJ. RAPID INSULIN titrated to optimal glucose levels ($< 200 \text{ mg / dl}$)
- 9) T.THYROXINE 400 MG through RT If inj is not available/T4 PROTOCOL.

With the application of the above protocol, the number of organs successfully harvested and utilised has significantly increased

We would accept that the tallest oak in the forest was once just a little nut that held its ground. Similarly we at the cadaver maintenance unit had our humble beginnings, but we have grown purely due to the commitment & integrity of our team

As Robert frost rightly said 'miles to go before I sleep' so is our team ready to take our unit to greater heights so that more deserving patients are benefitted.

References

1. Minnesota medical association criteria. Brain death concept and criteria
2. Cranford RE
3. Minn med 1978sep.61(9):561-3
4. Arbor , R(2013) Brain Death Assessment , controversy and confounding factors , critical care nurse,33:6,27-46
5. Transplantation of human organs act 1994
6. Transplantation of human organs (amendment) act, the gazette of india dated 28 sep 2011
7. GO ms no 75 health and family welfare department, government of tamil nadu dated
8. Shroff S. legal and ethical aspects of organ donation and transplantation. Indian J. urology. 2009;25:348-55
9. Amalorpavanathan J, Shroff S, Karunakaran CE, castro R. Annual report from Tamil nadu organ sharing registry year 2013-14.