

developing and of course brain death brought in the possibility of organ donation.

What does our law say

The Transplantation of Human Organs Act, 1994 (Central Act 42 of 1994).

'Deceased person' means a person in whom permanent disappearance of all evidence of life occurs:

1. By reason of brain stem death or
2. In a cardiopulmonary sense at any time after live birth has taken place.
3. 'Brain stem death' means the stage at which all functions of the brain stem have permanently and irreversibly ceased.

India follows the Brain Stem Death Criteria, it is important we do not mix the two and when we refer it in our communication, especially with the family, we mention it to the family that their loved one is "Dead".

Brain Stem (Fig. 2.1)

Brain Death

Brain death is established by documentation of:

1. Irreversible coma
2. Irreversible loss of brain stem reflexes
3. Cessation of respiratory centre function

The most important aspect of diagnosing brain death is "There is a clear cause of irreversible coma".

This means that brain death is only suspected in patients in whom there is clear cause of irreversible coma established.

Brain Death is Commonly Caused by

- Spontaneous intracranial hemorrhage
- Head injury due to motor vehicle accidents, recreational, industrial accidents, gunshot assault, etc.
- Cerebral anoxia/ischemic injury (cardiac arrest due to asthma, asphyxiation, drug overdose, hanging, drowning, meningitis, carbon monoxide poisoning, or primary cardiac arrest)
- Primary cerebral tumour.

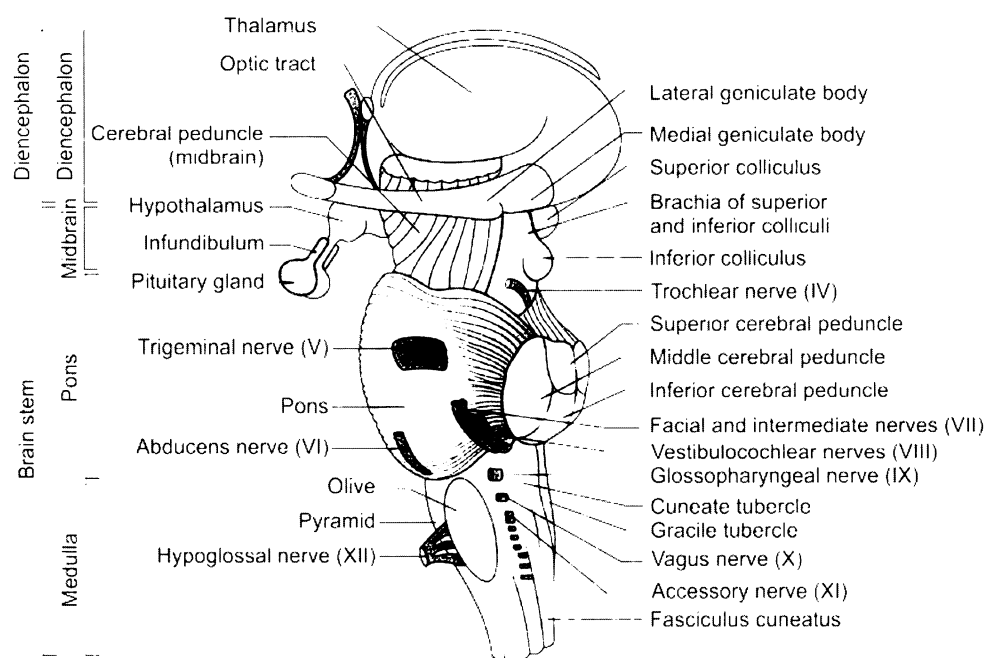


Fig. 2.1: Brain stem

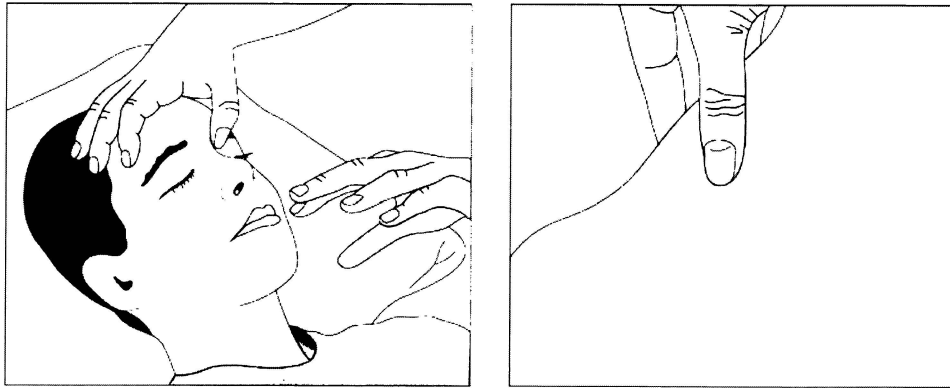


Fig. 2.5: Mechanism of cerebral death

- Beware of local spinal reflexes causing spontaneous or stimulus-related motor movements

2. Documentation of the Absence of Brain Stem Reflexes

- Brain stem reflexes are lost in a rostral-to-caudal direction
- Reflexes in medulla oblongata are the last to cease
- Tests documented are
 - Absent pupillary reflex
 - Absent oculocephalic movements (doll's eye reflex)
 - Absent oculovestibular reflex (cold calorie test)
 - Absent corneal reflex
 - Absent cough reflex

3. Documentation of Apnea (Apnea Test)

- Pre-oxygenation with 100% oxygen for at least 15 min.

- Give adequate volume and Vasopressors to keep MAP ~70 mm Hg
- CO₂ rises by around 3 mm HG/min of apnea, so be prepared to test at least for 8–10 min
 - a. Preoxygenate patient with 100% oxygen for 15 minutes
 - b. Obtain an ABG
 - c. Disconnect patient from mechanical ventilation
 - d. Continue to oxygenate through a catheter placed in the trachea—aim for saturation above 95%
 - e. ABG is repeated within about 8–10 minutes
 - f. Increase in PaCO₂ (above 60 mm Hg or 20 mm Hg from base line) and lack of respiration documented (use EtCO₂) if available

“Once the 2 specialists complete the test the time of death is confirmed as the end of second examination time”.

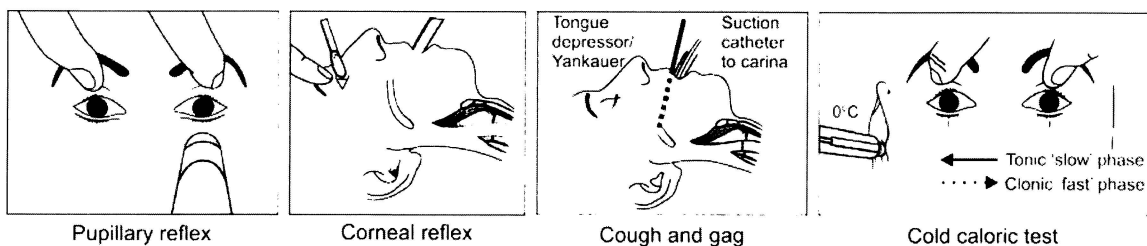


Fig. 2.6

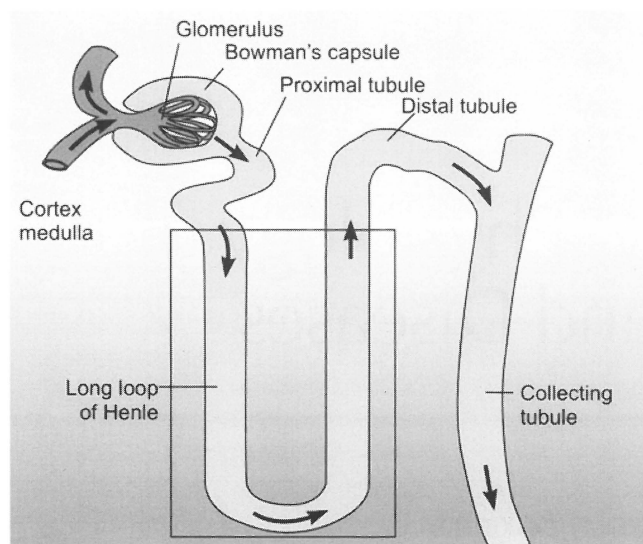


Fig. 1.2: Horseshoe kidney

It occurs during fetal development as the kidneys move into their normal position.

- They become attached ("fuse") together at the lower end or base. By fusing, they form into a U-shape, like a horseshoe.
- This is thought to happen more often in males than in females.
- Horseshoe kidney occurs in about 1 in 500 children (Fig. 1.3).

Anatomy of Ureter

These are slender tubes attaching the kidney to the bladder

- Continuous with the renal pelvis
- Enter the posterior aspect of the bladder

Anatomy of Urinary Bladder

- It is smooth, collapsible, muscular sac
- It temporarily stores urine.

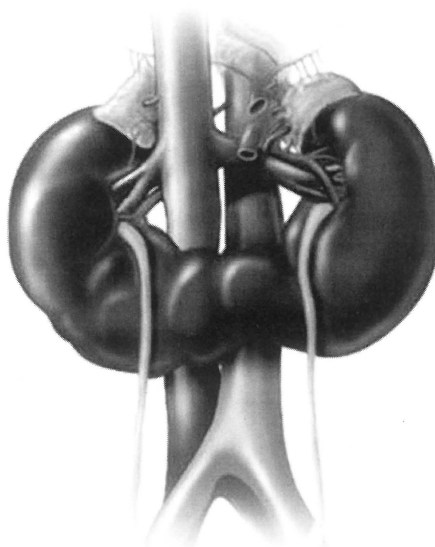


Fig. 1.3: Pictorial depiction of glomerulus and collecting system of kidney

Post-renal Transplant Medications and Precautions

MM Bahadur

Renal transplant is an operation where a genetically different kidney (allograft) is placed within a recipient to replace the function of the diseased one. Since even the best matched allograft is not an exact genetic match to the recipient it is recognized as 'foreign' by the body of the recipient and a process of rejection starts immediately and continues lifelong. This process needs to be suppressed by a combination of anti-rejection drugs which makes the recipient to accept the allograft but it comes with a necessary evil—predisposition to infections by reducing the immunity of the individual significantly.

Unlike liver, which is relatively a more tolerant organ requiring less immunosuppression, kidney does not achieve tolerance even years and decades after transplantation. Hence significant lifelong immunosuppression is a must. Even decades later any noncompliance of anti-rejection medications can lead to rejection of the transplanted kidney. This truth needs to be emphasized repeatedly to the transplant recipient, specially to the young, teenage patients who are most likely to be non-compliant.

Kidney allograft recipient requires triple drug immunosuppression. The drug regimen usually consists of at least one drug from each group given below:

- Steroid (Prednisolone, Deflazocort).
- CNI inhibitor—Calcineurin inhibitor—Tacrolimus, Cyclosporin

- Antimetabolite—Mycophenolate Mofetil, Azathioprine
- Sometimes the CNI inhibitor is replaced by mTOR inhibitor such as, Sirolimus or Everolimus.

In certain transplant centers induction immunosuppression is used in addition to the drugs in the form of injectable ATG or injectable Basiliximab pre-transplant in all cases. At other centers it is used selectively for high risk cases like sensitized individuals, poor genetic match and spousal transplants.

In the first few months prophylaxis has to be given for some infections which reside in the body such as cytomegalovirus (CMV), *Pneumocystis carinii* pneumonia (PCP), etc. but manifest as disease only when high dose immunosuppression is given in the early days post-transplant. These include acyclovir and septran. This is specially so if induction has been used in the form of injectable ATG or injectable Basiliximab pre-transplant.

Each group of drugs act at different sites of the rejection cascade and hence act synergistically to each other enhancing the blockade of the rejection cycle.

Besides the anti-rejection medicines, they generally require some medicines for blood pressure control and if they are diabetic either insulin injections or oral anti-diabetic medications or both.

Some calcium and vitamin preparations are also required for their well-being.