Transplantology (Nursing)

Transplantology is a multidisciplinary field that includes transplantation legislation, transplant recipient preparation, organ procurement for transplantation, surgery, postoperative care, immunosuppressive and anti-rejection therapy. Here you will find types of transplantation.

Brain Death Diagnosis

Death of the brain is the irreversible loss of brain function, including the brainstem → irreversible structural damage to the brain.

Three criteria

1. A condition where the diagnosis of brain death can be considered - auxiliary examinations (CT, MR, SONO, Doppler) → exclusion of a reversible cause of coma (intoxication, hypothermia, metabolic and endocrine disorders, sedative and relaxing effects of drugs), coma lasting more than 6 hours .
2. Diagnostic tests:
    - Spinal reflexes can be preserved!!!!!
        - Examination of the brainstem reflex - areflexia above C1.
        - Photoreaction – pupillary pupillary reflex.
        - Corneal reflex.
        - Vestibuloocular reflex.
        - Motor reaction during algic irritation.
        - Absence of reflex response to bronchial stimulation.
        - Apnea test.
        - Atropine test - not mandatory.
3. Investigations that detect brain death:
    - Cerebral panangiography.
    - Cerebral perfusion scintigraphy.
    - Investigation of auditory stem evoked potentials.
    - Transcranial Doppler sonography.

Legislative standards for organ harvesting

- Act No. 285/2002, every citizen of the Czech Republic is a potential donor, consent is required only for children, minors and incapacitated persons.
- Register of those who do not consent to postmortem sampling.
- Sampling is not performed for persons serving a sentence, suspected infectious disease, if the organs are not capable of good function, for sepsis and malignancies, with the exception of primary TU of the brain, some skin tumors, cervical tumors in situ.
    - Relative contraindications include organ injury, organ disease in the anamnesis, age of the donor, adverse results of clinical and biochemical examinations.
- A death certificate is mandatory.

Organ Donor

- "Ideal donor" age 5-55 years, negative medical history, hemodynamic stability, normal organ function, resuscitation care not exceeding 3 days.
- Living, dead donors.
- Examination before organ collection - exclusion of graft infection, routine laboratory tests + HIV, HbsAg, CMV, KS, HLA typing, size match of donor and recipient, surface marks on white blood cells - determination of 6 antigens - current crossmatch.

Organ Donor Care

- Comprehensive resuscitation care.
- Rule 4 x 100 → systole at least 100 torr, diuresis at least 100 ml/hour, pO_2 in ABR at least 100 mmHg, Hb at least 100 g/l.
- Organ perfusion → CVP 12–15 cm H_2O, balanced balance, vasopressors.
- Fluid balance - development of diabetes insipidus.
- Potassium substitution – hypokalemia, hypernatremia.
- Hypothermia – keep TT above 35 °C.
- Coagulation disorders - DIC.
- ATB prophylaxis.

Transplant Team and Coordinator Activities

- Transplantation centers by region.

- Determination of a potential donor - biochemical, hematological, virological, coagulation, neurological examination, ECHO during heart sampling, SONO during liver sampling,..., determination of brain death.
  - 🔎 *For more information see transplant laws.*
- Reporting to the coordination center in the Czech Republic → find a suitable waiting person → contact him and arrange transport to the hospital → arrange for an operating and transplant team, an operating room, time the collection in accordance with the arrival of the recipient, contact other centers, in the case of non-regional collection, ensure donor data, contact recipient, ensure transport of organs – RLP, LZS.

Operating theater

- Dilute preservation solutions, ensure organ perfusion, appropriate storage, packaging.
  - Cooling of organs = cold ischemia → time from interruption of blood circulation by an organ in the donor's body to restoration of blood circulation by an organ in the recipient's body.
    - Organs are kept in special preservation solutions, in 2 bags, the first one is water or preservation solution, the second is crushed ice, the third dry bag, sterile packed organ, transport in special boxes.
- Information on exact time collection, expected return, coordination with transplant centers, transport.
- The donor should go to the hall with complete documentation → 3x inspection sheet, 1x accompanying sheet for autopsy, brain death determination protocol.

Lung transplant

- Lung storage max. 5 hours
- Blood type identical, donor lung size = recipient, donor lung may be slightly larger.
- Recipient status, waiting time.
- Examination: CVP 6–10 cm H_2O, X-ray of the lungs 1 m from the X-ray plate, we measure the span of the wings of the lungs, bronchoscopy of the lungs.
  - Hyperoxygenation test: ABR examined 2 times in a row → 1st examination at a PEEP setting of 10 cmH_2O at UPV and FiO_2 0.40%, at the second PEEP 5 cmH_2O, FiO_2 100%.

🔎 *For more information see Lung Transplantation.*

Postoperative care, complications, drug therapy

- Postoperative care is among the most complex and demanding in intensive care, medicine, lung function is very vulnerable, the risk of rejection and infectious complications is very high.
- Important factors include algesia, airway, early initiation of oral intake, monitoring of physiological functions, results of complete sampling according to transplant centers.

Pulmonary complications

- Bleeding;
- pneumothorax;
- arrhythmia;
- in the postoperative period reperfusion edema of the lungs;
- acute rejection;
- infection (cytomegalovirus) = early diagnosis and treatment are important for survival;
- dehiscence of the bronchial anastomosis;
- stenoses;
- bronchomalacia.

Extrapulmonary complications

- Associated with immunosuppressive treatment:
  - chronic renal insufficiency;
  - hypertension;
  - osteoporosis;
  - DM;
  - gingival hyperplasia;
  - hisrsutism;
  - alopecia;
  - post-transplantation lymphoma;
  - cutaneous and non-cutaneous malignancies.

Therapy

- Inhalation of Amhotericin B, Gentamicin until complete healing of the bronchial anastomosis.
- Immunotherapy – very intensive.
  - Methylprednisolone
  - In the immediate postoperative period, a triple combination of immunosuppressants - used for life!!!! – Cyclosporin, Mycophenolate mofetil, Prednisone.
    - It is important to control the serum level and adequately adjust the dosage for the toxicity of the

given drugs,
    - Broad-spectrum ATB – Cotrimoxazole
- Bronchoscopy – control of bronchial anastomoses every 3 days at UPV, obtaining biological material, lavage, lung biopsy.
- Intensive physiotherapy: positional drainage after unilateral transplantation, position on the non-operated side improves ventilation of the transplanted lung, massages to mobilize secretions, prevention of hypostasis, intensive respiratory RHB, personal spirometers with instructions for home treatment - early detection of complications.

Life after transplant

- Diet and nutrition - rational diet - plenty of vegetables and fruits, avoid grapefruits - can increase the level of immunosuppressive drugs, low-salt diet.
- People with immunosuppressive treatment must not be given a vaccine with a live or weakened vaccine - vaccination against rubella, yellow fever,...
- In the first year after transplantation, avoid working in the garden - risk of aspergillus infection, use of masks in dusty environments, gloves, pets are not recommended.
- Driving motor vehicles is not recommended for at least four weeks, until the wound heals.
- Smoking and alcohol should be taboo!!!!

Nursing Diagnoses

Dg. for donor

- Ventilatory failure associated with confirmed brain death.
- **Respiratory failure associated with confirmed brain death manifested by inability to maintain spontaneous respiratory activity, inability to cough up sputum, apnea, and cyanosis after weaning from the ventilator**.
    - Goal: Maintain, ensure adequate controlled breathing with artificial pulmonary ventilation along with a clear airway.
    - Plan:
        - Sufficient suction according to the client's needs.
        - Administer medication as prescribed by the doctor.
        - Monitor and inform the doctor about laboratory results.
        - Monitor the parameters set on the ventilator including the mode, the value of the physiological functions on the monitor.
        - Monitor the color of the skin, the blood supply to the acral parts of the body.
        - Position the patient, if circulatory stable, in order to release secretions from the airways.
        - Ensure sufficient humidification of the respiratory tract.

- Impairment of skin integrity in connection with invasive inputs, surgical wounds after procedures.
- Impairment of movement in connection with the given brain disease.
- Impairment of verbal and non-verbal communication in connection with unconsciousness.
- Swallowing disorder in connection with the given disease.
- Disorder of perception in connection with the given brain disease.
- Impairment of sensory perception - smell, touch, taste, hearing and balance, vision in connection with the given brain disease.
- Inability to cooperate with the patient, client due to the given disease.
- Reduced intake of body fluids in connection with the given disease.
- Hyperthermia, hypothermia due to the inability to maintain body temperature due to impairment of the temperature regulation center.
- Malnutrition related to the given brain impairment.
- Disorders of emptying due to the given disease.
- Urinary disorder in connection with the disappearance of ADH.
- **Disruption of micturition in connection with the disappearance of ADH manifesting as a reduced specific gravity of urine and polyuria'**
    - Goal: To maintain the physiological specific value of urine and the volume of excreted urine in 24 hours.
    - Plan:
        - Ensure a sufficient supply of fluids into the body i.v. on the way
        - Monitor diuresis hourly, urine specific gravity and record the values in the documentation.
        - After consultation with the doctor, inform about the values.
        - Add ADH according to the doctor's office.

- Circulatory instability in connection with the given brain disease.
- Insufficient perfusion of organs in connection with the given disease.
- Disturbance of ion balance in connection with brain disease.
- Increased care of the respiratory tract in connection with connection to the UPV, collection of lungs for transplantation.
- Increased care for d.ú, eyes, inputs in connection with the given disease.
- Risk of infection in connection with the surgical wound after injuries to the brain, head, invasive inputs.

- Risk of organ infection in connection with transplantation.
- Risk of blood clotting disorders.
- Risk of disagreement between donor and recipient in connection with transplantation

program, with given examinations before transplantation.

Dg for donor family

- Adaptation disorder due to the death of a loved one, due to organ donation to a waiting person.
- Aggression of loved ones due to the inability to reconcile with the departure, death of a loved one.
- Hopelessness in connection with the death of a loved one.
- A feeling of lack of safety and security in connection with other life changes after the death of a loved one.
- Mental, psychological distress in connection with the loss of a loved one.
- Lack of information related to the donor program, transplantation legislation, the concept and process of dying.
- Social isolation due to the loss of a loved one.
- Loneliness in connection with deprivation due to fatigue, social isolation, loss of a close person.
- Disruption of family relationships, family functions in connection with the death of a close person.
- Anticipatory grief in connection with the loss of a loved one.
- Reactive grief in connection with the real loss of a loved one.
- Sleep disorders in connection with social isolation, death of a loved one, psychological stress.
- Fear due to lack of information, loss of life partner, close family member, due to concerns about personal life.
- Anxiety in connection with death, dying of a close person, own experience of the entire transplant process.

Dg. for recipient

- Pain related to the surgical wound.
- Respiratory failure related to lung transplantation.
- Trivialization in connection with life-long treatment, with postoperative regimen.
- Lack of information in connection with the course of the entire process of transplantology, in connection with the postoperative regimen, ambulatory treatment, regimen in the home environment.
- Risk of infection in connection with the surgical wound, with the transplanted organ, secured entrances to the organism.
- Risk of acute rejection in connection with the transplanted organ.
- Risk of extrapulmonary complications in connection with immunosuppressive treatment.

- '*Risk of infection in the organism in connection with the surgical wound, invasive inputs, with UPV*.
  - Goal: To prevent infection in the body.
  - Plan:
    - Monitor the laboratory results of inflammatory markers, culture results and inform the doctor.
    - Observe the principles of asepsis when treating the patient (dressings, treating entrances, suctioning from the airways, etc.).
    - Monitor the places of invasive entrances, monitor color, secretion, functionality.
    - Monitor sputum impurities, suction frequency.
    - Education of the family during visits about the use of disposable barrier devices.
    - Record the facts found and the interventions carried out in the nursing documentation.

Links

Related Articles

- Transplantation

External links

- Organ donation and brain death - interactive algorithm + test (https://www.akutne.cz/algorithm/cs/323--/)

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References

- ČERVINKOVÁ, Eliška, et al. *Ošetřovatelské diagnózy.* 4. edition. Brno : Národní centrum ošetřovatelství a nelékařských zdravotnických oborů, 2006. ISBN 80-7013-443-7.