الجامعة السورية الخاصة

كلية الطب البشري

قسم الجراحة

Principle of Transplantation

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LEARNING OBJECTIVES

- The immunological basis of allograft rejection
- The principles of immunosuppressive therapy
- The side effects of non-specific immunosuppression
- The major issues concerning organ donation

- The main indications for organ transplantation
- The surgical principles of organ implantation
- The causes of graft dysfunction
- The likely outcomes after transplantation

Definitions

- **Allograft**: an organ or tissue transplanted from one individual to another
- **Xenograf**t: a graft performed between different species
- **Orthotopic graft**: a graft placed in its normal anatomical site
- **Heterotopic graft**: a graft placed in a site different from that where the organ is normally located
- **Alloantigen**: transplant antigen
- **Alloantibody**: transplant antibody
- **HLA**: human leucocyte antigen, the main trigger of graft rejection

GRAFT REJECTION

ABO blood group antigens

Permissible transplants are:

- group O donor to group O, A, B or AB recipient;
- group A donor to group A or AB recipient;
- group B donor to group B or AB recipient;
- group AB donor to group AB recipient.

There is no need to take account of Rhesus antigen compatibility.

HLA antigens

- *Are the most common cause of graft rejection*
- *Their physiological function is to act as antigen recognition units*
- *Are highly polymorphic (amino acid sequence differs widely between individuals)*
- *HLA-A, -B (class I) and -DR (class II) are the most important in organ transplantation*
- *Anti-HLA antibodies may cause hyperacute rejection*

Types of graft rejection

Hyperacute

- Immediate graft destruction due to ABO or pre-formed anti-HLA antibodies.
- Characterised by intravascular thrombosis

Acute

- Occurs during the first 6 months
- T-cell dependent, characterised by mononuclear cell infiltration
- Usually reversible

Chronic

- Occurs after the first 6 months
- Most common cause of graft failure
- Non-immune factors may contribute to pathogenesis
- Characterised by myo-intimal proliferation in graft arteries leading to ischaemia and fibrosis

Staging of transplantation in surgical practice

- Urgent Transplantation .
- Planned Transplantation .

Requirements

- Recognized Transplantation Center .
- Bank of Information .
- Transplantation Team :
  1. Immunologist .
  2. Hematologist .
  3. Transplant Surgeon : Gen/Vascular / special e experience .
  4. Double operating theater .
  5. Trained operating nursing staff .
- Donor .
- Recipient patient .
- Postoperative care unit .
- Post transplantation outpatients clinic .
- IMMUNOSUPPRESSIVE THERAPY.

Overcoming the shortage of organs for transplantation

- Maximizing heart-beating deceased donation
- Use of marginal heart-beating deceased donors
- Use of non-heart-beating donors
- Use of split-liver transplantation
- Increased living donor kidney (and liver) transplantation

Clinical testing for brainstem death

- Absence of cranial nerve reflexes .
- Absence of motor response .
- Absence of spontaneous respiration .

Absence of cranial nerve reflexes

Two physicians should be involved (Neurosurgeon & Intensive care specialist) .

The treating physician should not be included .

- Pupillary reflex
- Corneal reflex
- Pharyngeal (gag) and tracheal (cough) reflex
- Oculovestibular (caloric) reflex

Absence of motor response

- The absence of a motor response to painful stimuli applied to the head/face and the absence of a motor response within the cranial nerve distribution to adequate stimulation of any somatic area is an indicator of brainstem death
- The presence of spinal reflexes does not preclude brainstem death .

Absence of spontaneous respiration

- After pre-ventilation with 100% oxygen for at least 5 min, the patient is disconnected from the ventilator for 10 min to confirm absence of respiratory effort, during which time the arterial Pco2 level should be > 8 kPa (60 mmHg) to ensure adequate respiratory stimulation.
- To prevent hypoxia during the apnoeic period, oxygen (6 l min-1) is delivered via an endotracheal catheter

Factors determining organ function after transplantation

- Donor characteristics .
- Procurement-related factors .
- Recipient-related factors .

Donor characteristics

- Extremes of age .
- Presence of pre-existing disease in the transplanted organ .
- Hemodynamic and metabolic instability .

Procurement-related factors

- Warm ischemic time .
- Type of preservation solution .
- Cold ischemic time Recipient-related factors .

Recipient-related factors

- Technical factors relating to implantation
- Hemodynamic and metabolic stability
- Immunological factors
- Presence of drugs that impair transplant function