Introduction

Renal transplantation is the treatment of choice for end stage renal disease

Quality of life, Reduced long term mortality rate & Cost effective

Cadaver, Living related & Living unrelated (emotional)
Organ transplant in 104 countries

- African region: 10 countries
- Region the Americas: 21 countries
- Southeast Asian Region: 9 countries
- Region of Europe: 40 countries
- Eastern Mediterranean Region: 12 countries
- Western Pacific Region: 12 countries
Every year around **1,00,800** solid organ transplant

<table>
<thead>
<tr>
<th>Organ Transplant</th>
<th>Number</th>
<th>Percentage from Living Donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney transplant</td>
<td>69,400</td>
<td>46%</td>
</tr>
<tr>
<td>Liver transplants</td>
<td>20,200</td>
<td>14.6%</td>
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<tr>
<td>Heart transplants</td>
<td>5,400</td>
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<tr>
<td>Lung transplants</td>
<td>3,400</td>
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<tr>
<td>Pancreas transplants</td>
<td>2,400</td>
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Ref: WHO report data analysed from 2008
In Bangladesh

Chronic Renal Failure: 20-25 thousand patients per year

Acute Renal Failure: 10-15 thousand patients per year

Every hour > 4 patient died due to kidney failure

Ref: Global Health Statistics (7.6/100,000/year), WHO May-2014 (24/100,000/year)
Demand for kidney transplant is 5000 per year

Renal Transplant done: 50-60 per year

Ref: The Open Urology & Nephrology Journal
ISSN: 1874-303X – Volume 10, 2017
World’s first kidney transplant – Boston, 1954, Identical twins
Surgeon - Dr Joseph Murray

First kidney transplant Bangladesh - October 1981

Only one center upto 2004, but now 8 centers
Three major centers in Bangladesh

BSMMU

BIRDEM

NIKDU
Stages of CKD

- **Normal**: 100 – 120 ml/min/1.73 sqm

- **Stage 1**: Kidney damage with normal ↓ GFR > 90

- **Stage 2**: Kidney damage with mild ↓ GFR 60 – 90

- **Stage 3**: Kidney damage with moderate ↓ GFR 30 - 59

- **Stage 4**: Kidney damage with severe ↓ GFR < 15 - 29

- **Stage 5**: Kidney Failure with GFR < 15

ESRD

Hemodialysis

Hemofiltration

Peritoneal dialysis

GFR < 10 ml/min

Renal transplantation

Kidney Disease

Normal Kidney

Diseased Kidney
Why ESRD

- Diabetes mellitus (40%)
- Hypertension (27%)
- Chronic glomerulonephritis (13%)
- Polycystic kidney disease (4%)
- Interstitial nephritis (4%)
- Others (12%)

Changes in the body in ESRD

- Anaemia, Platelet dysfunction, Bleeding diathesis, B- and T-cell dysfunction
  - Systemic HTN, LVH, CHF, Pulmonary edema, Cardiomyopathy, Hyperdynamic circulation
    - Nausea, Vomiting, Gastroperesis, GI bleeding, Uremic gastroenteritis
  - Volume expansion, Hyponatremia, Hypocalcemia, Hyperkalemia, Hyperurecemia, Metabolic acidosis
    - Hyperparathyroidism, Hypertriglyceridemia, Carbohydrate intolerance

Anaesthetic Challenges

- Anaemia
  - Low Serum protein & albumin level
- Uremic Coagulopathy
- Electrolyte abnormality
- Uremic Cardiomyopathy
- Delayed gastric emptying

Low Serum protein & albumin level
Uremic Coagulopathy
Electrolyte abnormality
Uremic Cardiomyopathy
Delay gastrointestinal emptying
Preoperative dialysis

- Optimize fluid and electrolyte balance
- Correct hemostatic abnormalities
- Reduced perioperative mortality rate from 16% to almost 0%

Ref: Anaesthesia for renal transplant: recent developments and recommendations
AV fistula

- Long term vascular access for HD
- Veins of the arm low blood flow, difficult to HD
- Peripheral arteries high blood flow, too small for repeated catheterization
- Large diameter and higher blood flow

Peripheral arteries high blood flow, too small for repeated catheterization

Veins of the arm low blood flow difficult to HD

Large diameter and higher blood flow

AV fistula
Preoperative evaluation

- ECG
- Chest X-ray
- CBC
- Electrolyte
- Coagulation profile
- Creatinine
- BUN
- Serum glucose
- Liver function test
- Urinalysis
- H/O Dialysis
- H/O AV fistula

Preoperative optimization

- Dialysis
- Correction of Coagulopathy
- Anaemia correction
- Correction of serum K level
- Blood pressure control
- Control of blood sugar
Preparation & premedication

Continue antihypertensive drugs

Oral hypoglycemic drugs should be converted to short acting insulin

Antibiotic prophylaxis – first generation Cephalosporin
(Cefazolin 1gm 30 min before surgery, if Penicillin allergic, Vancomycin 1 gm)
H₂ blocker: Aspiration Prophylaxis

Metoclopramide: 10 mg for accelerating gastric emptying, prevent vomiting, ↓ risk of aspiration

Immunosuppression: Methylprednisolone (Solumedrol 500 mg) & Mycophenolate mofentil (Cell Cept 500 to 1000 mg)

What type of Anaesthesia

General Anaesthesia – Preferred technique

Combined GA & Epidural

Epidural alone


Anaesthetic consideration during donor nephrectomy

V/Q mismatching due to positioning

Maintain Adequate hydration

Preoperative hydration 100ml/kg/hr (4/2/1) starting from midnight before surgery
Target Urine output at least 100ml/hr

Start Mannitol after induction upto nephrectomy (0.5gm/kg) 200-250 ml

Intraoperative infusion 20ml/kg/hr

Ref: Guidelines on anaesthetic management for renal transplant, Department of Anaesthesia & Intensive care Hospital, Kualalumpur, April-2013
Anaesthetic Consideration
Recipient
Volatile agents are nearly ideal for patients with renal dysfunction.

Safer agents are, Halothane, Isoflurane & Desflurane.
Intravenous agents

**Propofol**: The pharmacokinetics of this drug is not significantly altered

**Barbiturates**: Increase sensitivity due to an increased free circulating barbiturate as a result of decreased protein binding
**Opioids**: The accumulation of morphine and meperidine metabolites has been reported to prolong respiratory depression.

**Fentanyl, Remifentanil** pharmacokinetics are not affected by renal failure.
Succinyl choline: It can be safely used in patient with renal failure, provided serum potassium concentration should be < 5 meq/L

Cisatracurium & Atracurium do not depend on renal excretion. So, its our choice.
Kidney preservation (Cold Ischemic time)

Hypothermia

Temperature
37°C - 4°C

Ideal cold ischemic time
20 – 30 min
36 to 40 hours

Pharmacological by slow down metabolic process

1. Collins solution
2. Citrate solutions (Marshall/Ross)
3. University of Wisconsin Solution (UW)

Clamping time

- Reduced ischemic time
  - Inj. Furosemide 100mg (1 – 2mg/kg)
  - Inj. Sodium bicarbonate 50 mEq/l (1mEq/kg)
Fluid therapy

Hemodynamic Auto-regulation mildly decreases resulting in repeated ischemia to the transplanted kidney

Maintaining appropriate Renal perfusion pressure

Restoration and maintenance of intravascular volume – perioperative period

Good graft
Goal of fluid therapy:

- CVP > 12 mmHg
- Mean Arterial BP > 80 mmHg
- Systolic BP > 130 mmHg
- IV fluids at least 30-50 ml/kg/hr
0.9\% Normal saline causes hyperchloremic acidosis and Hartmann solution causes hyperkalemia

Mixture of 0.9\% Normal saline and Hartmann solution – Choice of fluid

Ref: Guidelines on anaesthetic management for renal transplant department of anaesthesiology and intensive care, Hospital Kuala Lumpur, April 2015, P-11,12
Intraoperative Monitoring

- Heart rate
- Temperature
- Continuous ECG
- Non-invasive blood pressure
- End-tidal CO2
- Oxygen saturation
- Central venous pressure
Postoperative care

- O₂ inhalation
- Control of blood pressure
- Collection of drain
- Urine output
Post operative pain

PCA

Morphine 1mg/bolus for Donor

Fentanyl 10mcg/bolus for Recipient

Epidurals

Transversus Abdominis Plane Block

Fascia Transversalis Block
- Started: 6th November 2004
- Total (Upto December 2016): 124
ASA II- Pt with mild systemic disease,
ASA III- Pt with severe systemic disease &
ASA IV- Severe systemic disease that constant threat to life
Hb • 7 – 9 gm% with an average of 8.2 (±2.0SD) gm%

S.K • 5 – 6.2 meq/l with an average of 4.5 (±0.64SD) mEq/l

S. Urea • 15 – 140mg/dl with an average of 20 (±2.15SD) mg/dl

S. Cr • 3.4–16 mg/dl with an average of 7.4 (±2.45SD) mg/dl

HD • Hemodialysis was done in 98 cases, before surgery within 24 hours
Anaesthesia

GA : 120 Cases

Combined (GA+Epidural) : 04 Cases
Neuromuscular blockade was maintained with Atracurium 0.5mg/kg
Average duration of surgery was 4.5(±1.20SD) hrs

Average duration of Anaesthesia was 4.8(±1.28SD) hrs

All patients extubated smoothly
Postoperative Complications

- Dialysis: 4 (3.23%)
- Pneumonia: 8 (6.45%)
- Acute tubular necrosis: 12 (9.68%)
- Pulmonary edema: 5 (4.03%)
- Acute graft rejection: 8 (6.45%)
- Re-exploration: 3 (2.42%)
Transplant team


