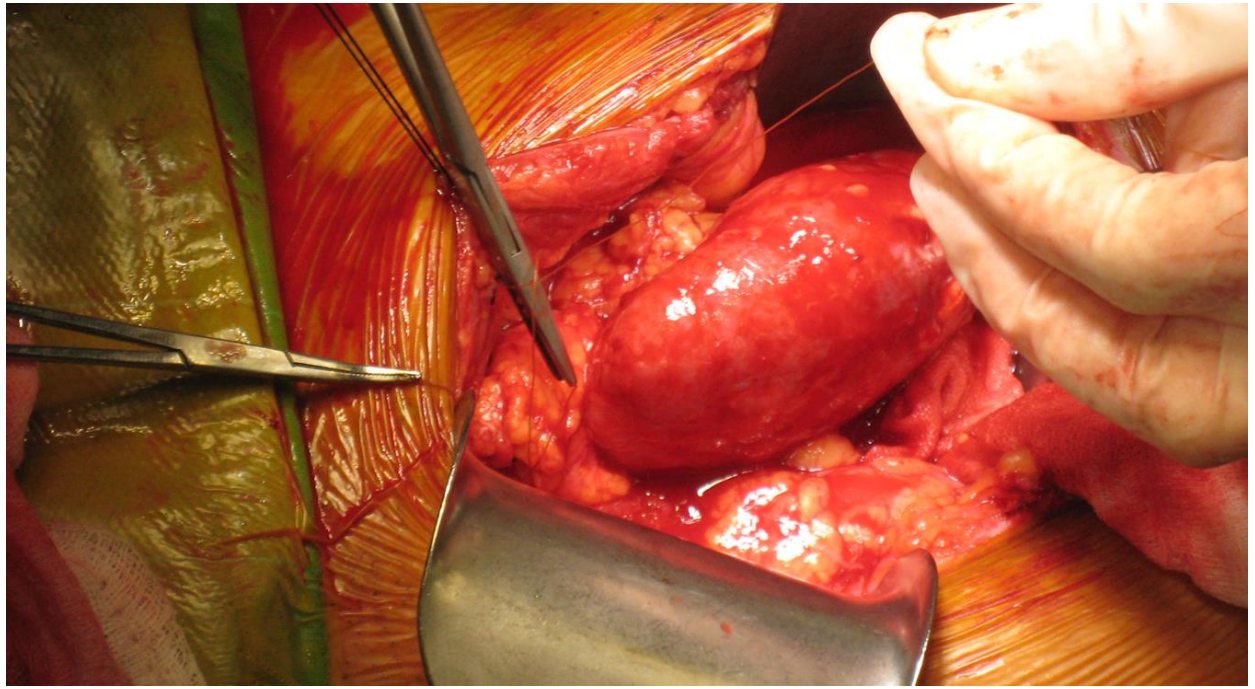
Kidney Transplant- Selection of Recipients, Donors and the Preparations



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Selection of Kidney Transplant Recipients and Preparation

- Cause of Kidney Disease

- Recurrence risk in primary focal segmental glomerulosclerosis, hemolytic-uremic syndrome, membranoproliferative glomerulonephritis, and primary oxalosis

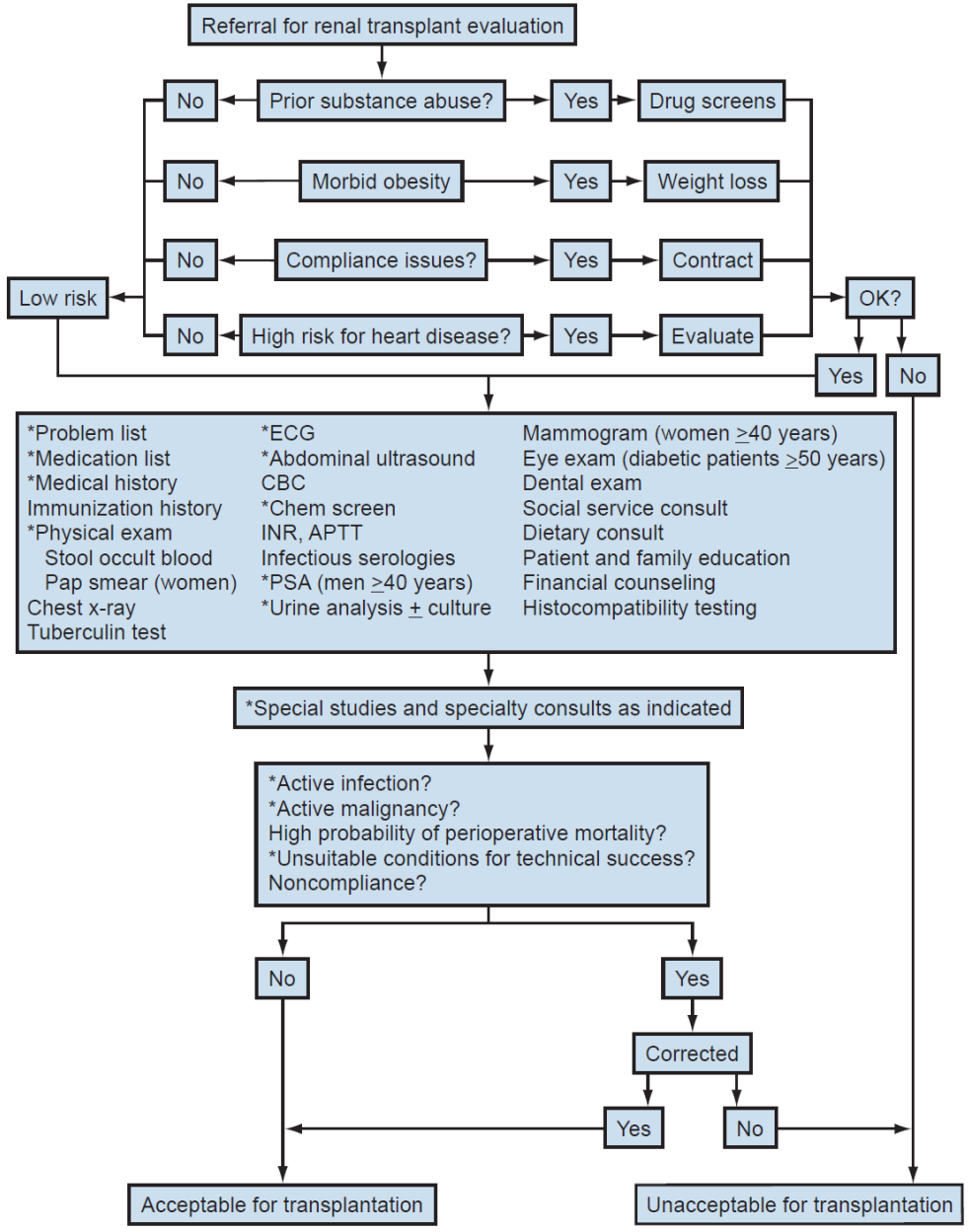
- HTN and DM are the most common causes of renal failure in adults need to be controlled after RTx for better outcome

- History of childhood enuresis or urinary tract infections (UTIs) should be ware of congenital urinary tract abnormality

Preliminary screening

- Identify absolute contraindications and modifiable risk factors

- The patient must be educated
  - the risks associated with their cause of renal failure
  - comorbidities
  - operative procedure and risk
  - immunosuppression



- Urologic Procedures for evaluation in case of
  - UDS in Voiding dysfunction and history of pyelonephritis or reflux
  - Cystoscopy in suspected lower urinary tract abnormality
  - Retrograde pyelography in suspected upper urinary tract abnormality
  - CT scan in suspected renal lesion could not be confirmed by echogram

- Pre-op daily urine amount assessment

- Small bladder capacity due to anuria have possibility to regain normal volume within weeks of transplantation

Selection of Kidney Transplant Recipients and Preparation

- High Risk of Perioperative Morbidity or Mortality

- Comorbidity of ESRD increasing risk including CAD, CVA, CHF and DM
- Screened with Cardiac echogram and/or nuclear-medicine cardiac imaging to evaluate myocardial perfusion, ejection fraction, and valvular function
- Poor outcomes in tobacco use
- Any respiratory disease that requires home oxygen is a relative contraindication
- Non-adherence

Selection of Kidney Transplant Recipients and Preparation

- Malignancy in Transplant Candidate

- Relative risk for cancer of approximately 1.2 times in ESRD patient
- Disease free waiting period depends on cancer type and risk
- Patients who have low-risk disease felt to be amenable to active surveillance should be considered candidates for transplantation
- Asymptomatic microscopic hematuria should be evaluated according to the American Urological Association (AUA) guidelines (The risk for both kidney and UB cancer is increased with renal failure)
- Complicated renal cysts should be monitored with serial imaging and consider nephrectomy if suspected malignancy and the urine output is limited

Selection of Kidney Transplant Recipients and Preparation

- Preservation of residual renal function
  - Limit the need for fluid and food restrictions
  - Improve the management of hypertension
  - Reduce cardiac complications
  - Reduce the unnecessary of operative and anesthesia risk for nephrectomy
  - Indication for native nephrectomy must be balanced by the risk of observation

Selection of Kidney Transplant Recipients and Preparation

- Indications and Timing of Native Nephrectomy
  - Symptomatic renal stones could not be cleared by minimal surgery
  - Solid renal tumors
  - Polycystic kidneys that are symptomatic
  - Complicated renal cysts
  - Persistent anti-glomerular basement membrane antibody levels
  - Significant and uncontrolled proteinuria
  - Recurrent pyelonephritis
  - High grade VUR with UTI

Selection of Kidney Transplant Recipients and Preparation

- Treatment of Bladder Outlet Obstruction

  - Medical treatment with α-adrenergic blocking agents and 5α- reductase inhibitors
  - In some cases will be beneficial of α-blocker in control HTN
  - TURP or laser operation in poor medical response
  - High risk of BNC or urethral stricture in uremic patient

Selection of Kidney Transplant Donors and Preparation

- Deceased Donor Allocation and Selection

- Patients listed for kidney transplantation continues to expand disproportionately to the number of kidney transplantations performed

- Currently more than 8,200 patients waiting for deceased-donor kidney transplants, and with about 150 deceased-donor kidney transplantations performed annually

Selection of Kidney Transplant Donors and Preparation

- Inadequate supply of deceased-donor kidneys
  - Increased the use of marginal deceased donor kidneys
  - Increased the use of living donor kidneys

- Increase in living renal donation
  - Minimally invasive donor nephrectomy techniques
  - Acceptance of living, biologically unrelated renal donors
  - Development of protocols for transplantation across ABO blood group incompatibility

Selection of Kidney Transplant Donors and Preparation

腎臟

- Current allocation policy is available at the Taiwan Organ Registry and Sharing Center website

財團法人器官捐贈移植登錄及病人自主推廣中心

人體器官移植條例

人體器官移植條例 (民國 104 年 7 月 1 日 修正)

法規名稱	人體器官移植條例 (民國 104 年 7 月 1 日 修正)
第 1 條	為恢復人體器官之功能或挽救生命，使醫師得摘取屍體或他人之器官施行 移植手術，特制定本條例。 本條例未規定者，適用其他法律之規定。
第 1-1 條	本條例所稱衛生主管機關：在中央為行政院衛生福利部；在直轄市為直轄市政府；在縣 (市) 為縣 (市) 政府。
第 2 條	施行移植手術應依據確實之醫學知識，符合本國醫學科技之發展，並優先考慮其他更為適當之醫療方法。
第 3 條	本條例所稱器官，包括組織。 依本條例移植之器官，其類目由中央衛生主管機關依實際需要指定之。

絕對因素:血型

- 血型相同或血型相容者。

備註:

一、 血型相同：器官捐贈者與待移植者之ABO血型一致。

二、 血型相容：指符合下列各款之一者：

1. 器官捐贈者血型O型，待移植者血型為A型、B型或AB型。
2. 器官捐贈者血型A型或B型，待移植者血型為AB型。

絕對因素:B型肝炎

- 器官捐贈者為「B型肝炎表面抗原陽性(HBsAg(+))」或「B型肝炎表面抗原陰性且表面抗體陰性且核心抗體陽性(HBsAg(-) and Anti-HBs(-) and Anti-HBc(+))」：僅能分配予「B型肝炎表面抗原陽性或表面抗體陽性或核心抗體陽性(HBsAg(+) or Anti-HBs(+) or Anti-HBc(+))」之待移植者。

絕對因素:C型肝炎

- 器官捐贈者「有C型肝炎(Anti-HCV(+))」：僅能分配予「有C型肝炎(Anti-HCV(+))且尚未治癒」之待移植者。

絕對因素:人類免疫缺乏病毒陽性

- 器官捐贈者為「人類免疫缺乏病毒陽性(HIV(+))」：僅能分配予經書面同意之「人類免疫缺乏病毒陽性(HIV(+))」之待移植者。

相對因素

1. 待移植者之優先順序：人類白血球抗原(HLA)無錯配「zero ABDR mismatch」且其配偶或三親等以內血親曾為死後器官捐贈者、人類白血球抗原(HLA)無錯配「zero ABDR mismatch」、人類白血球抗原(HLA)非無錯配「non-zero ABDR mismatch」且其配偶或三親等以內血親曾為死後器官捐贈者、人類白血球抗原(HLA)非無錯配「non-zero ABDR mismatch」。
2. 辦理器官捐贈者之醫療照護、腦死判定、必要性檢查與檢驗、協助司法相驗、器官分配聯繫運送、遺體禮儀及資料登錄通報等事項之醫院。
3. 地理位置：器官捐贈者及待移植者所在區域相同為優先。
4. 評分基準:「評分高」優先於「評分低」之待移植者。
5. 評分基準中，血型相同者加三分。
6. 評分相同時，優先順序為「HLA組織抗原符合配對」之得分高低、「病人年齡」之得分高低、「等候時間長短」，最後由移植醫師以「臨床診斷預後最佳考量」為前提，確認待移植者序位。
7. 曾為活體肝臟或腎臟器官捐贈者。

備註:

1. 依左列順序比較。
2. 依醫療常規，待移植者以接受一枚腎臟為原則。

Selection of Kidney Transplant Donors and Preparation

- Categories of kidney donors:
  - Standard criteria donor (SCD)
  - Expanded criteria donor (ECD)
  - Donation after circulatory death(DCD)

- The category of donor organs must be decided by the patient and transplant physician

Selection of Kidney Transplant Donors and Preparation

- SCDs are younger than 60 y/o and do not meet any criteria for ECD

- ECD donors
  - Age over 60
  - Age 50 -59 with >2 risk factors such as death stroke, HTN, or elevated creatinine >1.5 mg/dL

- ECD organs have a 2-year graft survival of 80% versus 88% for an SCD organ

- DCD kidneys
  - Varying lengths of warm ischemia time
  - Susceptible to delayed graft function
  - Long-term graft survival is comparable to SCD kidneys

Selection of Kidney Transplant Donors and Preparation

- Specific consideration such as

- Pediatric donor kidneys may be transplanted en bloc, or, if large enough, split and allocated to two recipients

- Patients with ESRD who have hepatitis C virus (HCV) infection can be transplanted with kidneys from donors who are also HCV positive

- Such recipients should have detectable HCV viral load an no evidence of cirrhosis
- Also consideration in HIV patient

Selection of Kidney Transplant Donors and Preparation

- Histocompatibility

- Human major histocompatibility complex (MHC) is a cluster of more than 200 genes on chromosome 6p21.31
- Expressed as cell surface proteins on the renal allograft
- Recognized by the recipient’s leukocytes and trigger the immune response
- Also serves the important function of protecting the host from pathogens

Selection of Kidney Transplant Donors and Preparation

- Nomenclature of the highly polymorphic HLA antigens

 - Class I (HLA-A, HLA-B, and HLA-C)

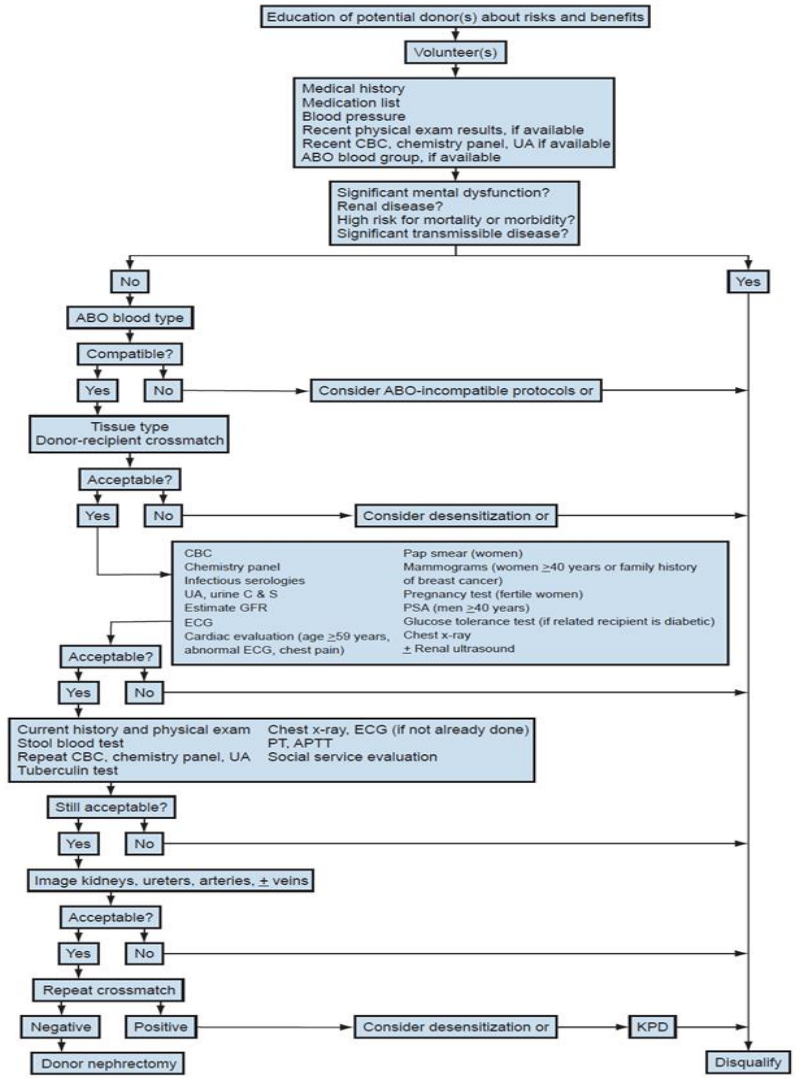
 - HLA class I genes are expressed by all nucleated cells

- Class II (HLADR, HLA-DQ, and HLA-DP)

- HLA class II genes are expressed by antigen-presenting cells (dendritic cells, monocytes, macrophages, and B-lymphocytes) and inflamed tissues (endothelial cells)

Selection of Kidney Transplant Donors and Preparation

- Living donor evaluation
  - Medical and urological Hx evaluation
  - Renal and urinary tract anatomy evaluation
  - Recurrent UTIs
  - Nephrolithiasis
  - Genitourinary malignancy
  - Hematuria
  - Congenital disease



Selection of Kidney Transplant Donors and Preparation

- Donor protection consideration
  - Excellent health
  - No family Hx of HTN, DM, renal disease
  - BMI < 30
  - Donors younger than 25 years (more years after donation to develop diseases)
- Hyper-filtration injury has not been a significant problem because of endogenous creatinine clearance rapidly approaches 70% to 80% of the preoperative level, and sustained for more than 10 years

Selection of Kidney Transplant Donors and Preparation

- ABO Blood Groups

- Carbohydrate antigens expressed on the surface of red blood cells
- Antibodies will bind to the non-inherited carbohydrate antigens expressed on endothelial cells, leading to activation of the complement cascade, coagulation, thrombosis, and rapid graft loss in ABO incompatible patients
- Certain immunosuppressive medications limit these antibodies in ABO incompatible renal transplants
- The graft endothelial antigen expression downregulated and chronic complement activation is minimal.

Selection of Kidney Transplant Donors and Preparation

- ABO incompatible renal transplants

-Accetable graft and patient survival in ABO incompatible renal transplants

- Longer term results are not equivalent to blood-type compatible transplants

- Protocols for such transplants varies widely across different programs

-- Plasmapheresis

-- IV immunoglobulin (IVIG)

-- Rituximab

-- Splenectomy

-- Require more intensive immunosuppressive regimens

Kidney Recipients Preparation

- Example for recipients in-hospital preparation

-Sign op and Anesthesia Permit

-NPO except medicine midnight before op day

-On and keep IV line

-Chest PA, KUB, EKG, CBC/DC, PT/APTT

-Biochemistry (BUN, Cr, AC Sugar, Na, K, Cl, Ca, P, cholesterol, TG) , ABO & Rh typing p.r.n.

-RBC Cross matching & Ab Screening for blood transfusion

-B/T Lymphocyte cross matching PRA (Class I /II)

Kidney Recipients Preparation

- Example for recipients in-hospital preparation (cont.)
  - Sodium chloride 0.9% 500ml/BT, ST, IVD
  - Cefazolin 1gm/Vial sent to OR, ST, IVD
  - Nystatin susp. 100,000U/ml 24ml/BT 3ml ST,PO
  - Omeprazole Infusion 40mg/Vial pre-op on call, ST, IVD

- Evaluation of H/D or release PD fluid

Kidney Recipients Preparation

- Example for recipients induction medication and preparation

- Methylprednisolone 1g sent to OR, ST, IVD,
- Simulect 20mg + distilled water 5cc IVD before op
- Tacrolimus 0.15mg/kg/day, in 2 dividing doses or cyclosporin 5mg/kg/day, in 2 dividing doses
- Mycophenolate mofetil 250mg/Cap or Mycophenolate sodium 80mg/Tab, 2~3# BID, PO before op

Summary

- The incidence of ESRD is greater than any urologic malignancy except PCa
- More patients die of ESRD than of any urologic malignancy annually
- Evaluation of ESRD patients for renal transplantation is important to prevent wastage of kidney grafts
- New options are available to allow transplantation with ABO incompatibility and positive cross-matches
- Urologists must be aware of the potential genitourinary problems of transplant recipients