

## PENELITIAN

## Kidney Transplantaion: Kidney Donor

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## ABSTRACT

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Chronic Kidney Disease (CKD) is a global public health problem where there is a decrease in kidney function which is marked by a decrease Glomerular Filtration Rate (GFR) slowly over a period of time. The incidence of CKD is increasing rapidly and is expected to become the 5th most common cause of death worldwide by 2040. Kidney transplantation from a living donor is the treatment of choice for most patients with End-Stage Renal Disease (ESRD). However, the absence of specific regulations related to kidney transplantation and guidelines for implementing regulations has become one of the obstacles in the development of kidney transplantation in Indonesia. In addition, a thorough evaluation of potential living donors requires a lot of resources. Early triage of an unsuitable donor will help maximize benefits, minimize risks, and manage expectations for both donors and recipients, and their families. Past and current medical history, family history, and general medical assessment are important to explore the possibility of previously undiagnosed diseases in potential donors. Pre-operative care and preparation as well as types of surgery and anesthesia should also be carried out by a team with adequate expertise, and in an environment where the donor is cared for on a regular basis.

**Keywords:** chronic kidney disease, kidney transplant, living donor

## 1. Introduction

According to Kidney Disease Quality Outcome Initiative (K/DOQI), chronic kidney disease (CKD) is defined as kidney damage or glomerular filtration rate (GFR)  $<60$  mL/min/1.73 m<sup>2</sup> for 3 months or more, regardless of cause (KDIGO, 2020). Currently, kidney transplantation is the most ideal option for end-stage renal disease (ESRD) which can improve the quality of life (Dewi M, 2017). However, only 15% of patients with ESRD undergo kidney transplantation therapy in Indonesia (PERNEFRI, 2013). The imbalance between "supply" and "demand", the absence of a coherent system, and the lack of a number of transplant centers, as well as limited human resources are still a challenge in implementing transplants in many countries,

including Indonesia (Ke C *et al*, 2022). For donors, transplantation is not just transferring organs to other people, but physical, psychological and social support, especially in the post-transplant period, must be considered. Therefore, this research was made with the aim of knowing about kidney transplantation in general, particularly regarding procedures and preparations for kidney donation.

## 2. Kidney Transplant

Based on the donor, there are two types of kidney transplants, *living donor kidney transplant* or also called a living donor and *deceased donor kidney transplant* or called cadaver donor. In Indonesia, kidney transplantation still refers to transplantation with living donors. Kidney transplantation from a living

donor is the treatment of choice for most patients with end-stage renal disease. Living donor transplants can increase the chance for recipients to benefit from a transplant they might not have received from the waiting list of deceased donors and had a better kidneys quality. The donor evaluation process is important to ensure the suitability of the donor and minimize the risk of donation. This includes identification, contraindications to donation, and potential clinical risks, both physical and psychosocial (KDIGO, 2020).

**2.1 ABO Blood Grouping And Crossmatch Testing**

The ABO blood grouping is an important initial screening test to identify whether a donor's blood group is compatible or incompatible with that of the intended recipient. After blood group examination, the donor is then subjected to HLA examination (*Human Leucocyte Antigen*). If ABO or HLA incompatibility exists, alternative options for transplantation should be discussed with the donor and recipient. Incompatible antibody transplantation should only be performed in a transplant center with relevant experience and appropriate support (British Transplantation Society, 2018).

**2.2 General Medical Assessment**

Medical assessment is important to reveal previously undiagnosed diseases in potential donors. A complete past and present medical history as listed in Table 2.1 must be followed up if necessary. The history aims to identify the risk of latent or current infection in the donor which may be transmitted to the recipient (Table 2.2). A thorough clinical examination should be carried out with special consideration of the cardiovascular and respiratory systems and including the assessments listed in Table 2.3 (Massey EK *et al*, 2017).

- Hematuria/proteinuria/urinary tract infection
- Difficulty urinating, including urgency, frequency, dysuria
- History of peripheral edema
- Gout
- Nephrolithiasis
- Hypertension
- Diabetes mellitus, including family history
- Ischemic heart disease/ other peripheral vascular disease/ atherosclerosis
- Cardiovascular risk factors
- Thromboembolic disease
- Sickle cell and other hemoglobinopathies
- Weight changes
- Changes in bowel habits
- Prior jaundice
- Past or current malignancy
- Systemic disease that may involve the kidneys
- Chronic infections such as tuberculosis
- Family history of kidney conditions that may affect the donor
- Smoking
- Current or past alcohol or drug dependence
- Mental health history
- Obstetric history
- Residing abroad
- Previous medical assessment eg. for life insurance
- Prior anesthetic problems
- History of back or neck pain and trauma
- National screening program test results, such as cervical smear, mammography, and colorectal screening

**Table 2.1 Summary of Key Points in Medical +/- Family History of Prospective Kidney Donor**

**Table 2.2 History of Transmitted Disease**

<b>Previous Illness</b>
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<ul style="list-style-type: none"> <li>• Jaundice or hepatitis</li> <li>• Malaria</li> <li>• Previous blood transfusion</li> <li>• Atypical tuberculosis/mycobacterium</li> <li>• Family history of tuberculosis</li> <li>• Family history of Creutzfeldt-Jakob disease, previous treatment with natural growth hormone, or undiagnosed degenerative neurological disorder</li> <li>• Certain geographic risk factors: e.g. fungi and parasites, tuberculosis, hepatitis, malaria, intestinal worms</li> </ul>
<p><b>Increased risk of infection with HIV, HTLV1 and HTLV2, Hepatitis B and C</b></p>
<ul style="list-style-type: none"> <li>• Hemophilia or a sexual partner with hemophilia</li> <li>• High risk sexual behavior</li> <li>• History of hepatitis or syphilis infection</li> <li>• History of intravenous drug use</li> <li>• Tattoos or skin piercings within the last 6 months</li> <li>• Sexual partners with positive serology</li> <li>• Sexual partner with drug addict</li> </ul>

**Table 2.3 Matters of Importance in Clinical Examination of Prospective Kidney Donors**

<ul style="list-style-type: none"> <li>• Distribution of belly fat</li> <li>• Blood pressure</li> <li>• Body mass index</li> <li>• Dipstick urinalysis</li> <li>• Evidence of self-harm</li> <li>• Examination of abdominal masses or hernias</li> <li>• Examination of previous scars or surgeries</li> <li>• Lymphadenopathy examination</li> <li>• Regular breast self-examination/history</li> <li>• Regular testicular self-examination/history</li> <li>• Examination of the cardiovascular and respiratory systems</li> <li>• Mental health</li> </ul>
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**2.3 Assessment of Renal Function**

Long-term outcome studies show a very small increased risk of ESRD in the donor population with an mGFR greater than 80 mL/min/1.73m<sup>2</sup> where the average age at

donation is around 40-50 years. Meanwhile, the GFR threshold was >90 mL/minute/1.73m<sup>2</sup> has been established for donors aged <30 years (Grams ME *et al*, 2016).

**2.4 Age of Donor**

Younger donors, even without kidney disease risk factors at the time of evaluation, may still have diabetes, hypertension, obesity, or other immunologically mediated disease or kidney risk factors, and have more time for these risk factors to develop into CKD and eventually to be ESRD. The last five years have seen a significant increase in the number of living donors in the UK from the age group 60-69 years and >70 years. Donors over 60 years of age need careful consideration regarding the increased risk of peri-operative complications, existing co-morbidities, post-donation residual function, and also the long-term transplant outcome in recipients associated with reduced donor GFR and potential for donor vasculopathy (British Transplantation Society, 2018).

**2.5 Obesity in Donors**

In the general population, obesity is associated with increased morbidity and mortality. Obesity is considered a relative contraindication to living kidney donors because of the increased risk of surgical complications and the adverse effects of obesity on kidney function in the long term (British Transplantation Society, 2018).

**2.6 Hypertension in Donors**

Hypertension itself is a condition where a person's blood pressure is above 140/90 mmHg. Hypertension is one of the most common reasons for declaring a potential kidney donor medically unsuitable. Increased blood pressure after donation may also increase cardiovascular and ESRD risks in the future. A donor with mild or moderate hypertension may still be considered for nephrectomy, especially if blood pressure is controlled by non-pharmacological methods and 1 or 2 antihypertensive drugs (KDOQI, 2019).

**2.7 Diabetes Mellitus in Donors**

All potential donors must have fasting glucose measurements taken to rule out diabetes. Fasting venous plasma glucose >7.0 mmol/L indicates diabetes. Diabetes can also be

diagnosed based on HbA1c criteria, which a result of  $>48$  mmol/mol (6.5%) is sufficient to diagnose diabetes if confirmed by repeat testing. Consideration of a person with diabetes as a potential donor requires a thorough evaluation of the risks and benefits of donation and transplantation, both for the donor and the recipient (KDOQI, 2019).

## 2.8 Cardiovascular Evaluation of Donors

Cardiovascular assessment prior to donation has two objectives: to identify potential donors with a higher risk of peri-operative complications and to consider the long-term effects of kidney donation, so that can reduce the development of heart disease. Electrocardiography complements the clinical assessment and can demonstrate the presence of ischemic heart disease or pre-existing cardiomyopathy (Lam NN *et al*, 2017).

## 2.9 Proteinuria in Donors

Proteinuria should be measured in all potential living kidney donors. Increased urinary protein excretion is a marker of renal damage, reflecting increased glomerular permeability (albuminuria) or decreased tubular reabsorption. Proteinuria can also be a manifestation of conditions other than kidney disease such as lymphoproliferative disorders or lower urinary tract disease (Grams ME *et al*, 2016).

## 2.10 Nephrolithiasis in Donors

The use of CT to evaluate potential kidney donors has led to increased detection of asymptomatic kidney stones, which are generally small (4 mm) and are present in approximately 5% of potential kidney donors who undergo non-contrast CT scanning. If significant metabolic abnormalities are found and cannot be corrected, kidney donation is contraindicated. However, donation may be considered in potential donors with minor or repairable metabolic abnormalities, such as isolated hypocitraturia, isolated hypercalciuria, or isolated hyperuricosuria. Donation may be considered if factors that previously put the patient at risk for stone formation, such as diet or medication, have been successfully modified, urine pH has been corrected to normal, and 24-hour urine levels

have shown a return to the normal range (Isburgh J *et al*, 2013).

## 2.11 Surgery on the Donor

The transplant unit should have a written protocol detailing the peri-operative preparation and postoperative care of the donor kidney. Imaging of kidney before nephrectomy can be done using several modalities, such as *Ultrasound*, *Catheter Angiography (CA)*, *Digital Subtraction Angiography (DSA)*, *Computed Tomography (CT)*, and *Magnetic Resonance Angiography (MRA)*. The majority of donor nephrectomies in the UK are performed using minimally invasive techniques, either full laparoscopy or by hand, using a trans- or retro-peritoneal approach to the kidney. The left kidney is usually preferred because of the greater length of the left renal vein, assuming both kidneys have the same number of arteries (British Transplantation Society, 2018).

## 2.12 Preoperative care and Preparation

Live donor operations should be carried out by a team with sufficient expertise, and in an environment where the donor is regularly cared for. It is recommended that the transplant unit should perform at least 20-30 live donor surgeries per year and should regularly audit the results. In addition, anesthetist consultants and surgeons who have experience in handling such cases are needed (British Transplantation Society, 2018).

## 2.13 Postoperative Analgesia

Adequate analgesia is essential to achieve excellent results. However, balancing the degree of analgesia with the unwanted side effects of analgesic agents requires observing and an individual approach to each patient (British Transplantation Society, 2018).

### a. Epidural anesthesia

Epidural anesthesia can achieve excellent postoperative analgesia as well as significantly reduce the stress response to surgery. However, side effects such as hypotension, headache, potential for infection, urinary retention, and reduced mobility are considerations in the use of epidural

anesthesia, especially when neferectomy is performed with laparoscopy (British Transplantation Society, 2018).

### b. In-Dwelling Nerve Catheter

Blockade of the nerve supply to the wound under local anesthetic is a very easy and attractive option as an 'opiate sparing' technique. Nerve catheters can provide safe and effective analgesia for a variety of surgical wounds in the chest, abdomen, upper and lower extremities. Its use in donor nephrectomy is new but has been shown to reduce the need for opiates in hand-assisted laparoscopic nephrectomy as well as full laparoscopic nephrectomy (British Transplantation Society, 2018).

### c. Opiate

Opiates are effective analgesics and remain a common treatment for postoperative pain control worldwide. However, the short-term side effects of this

class of drugs such as drowsiness, nausea, vomiting, itching and lack of appetite are against the principle of operation with Enhanced Recovery (ERAS) that aimed at early mobilization and return to oral intake (British Transplantation Society, 2018).

### 3. Conclusion

The increasing number of end-stage renal disease is a challenge for the world's health systems. Kidney transplantation from a living donor is the treatment of choice for most patients with end-stage renal disease. Living donor transplants can increase the chance for recipients to have benefit they may not have received from waiting lists of deceased donors and better quality of kidneys. However, adequate resources and facilities are needed in the evaluation process for potential donors both before and after the transplant process.

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