

CHAPTER 1.2 Kidney transplantation after deceased or living donation

Burkhard Tönshoff¹ & Lars Pape²

¹ Heidelberg University, Medical Faculty Heidelberg, Department of Paediatrics I, University Children's Hospital, Heidelberg, Germany

² Department of Paediatrics II, University Hospital of Essen, Essen, Germany

ORCIDiDs:

Burkhard Tönshoff: <https://orcid.org/0000-0002-6598-6910>

Lars Pape: <https://orcid.org/0000-0002-3635-6418>

1 Pre-emptive kidney transplantation

In recent years, it has been shown that kidney transplantation performed pre-emptively, i.e. without prior dialysis therapy, can result in

- Better patient survival,
- Superior short- and long-term graft survival compared to the results after prior prolonged dialysis therapy.
- Complete avoidance of dialysis-associated medical and psychosocial complications

However, in most developed countries, pre-emptive transplantation remains the minority. In Germany, for example, only 15–20% of transplantations in children and adolescents are currently performed before the need for dialysis is reached with a residual kidney function (estimated glomerular filtration rate, eGFR) of approximately 5–10 mL/min/1.73 m². Depending on the waiting time in the different allocation systems, most pre-emptive transplantations are carried out from living donors. The exact criteria for the timing of a pre-emptive transplantation have not yet been clearly defined; the date should be determined on a case-by-case basis, taking into account medical and psychosocial aspects.

2 Listing for deceased donation and organ allocation

If the patient is in a transplantable condition, he or she is registered on a waiting list through the responsible transplant centre. A national list is maintained with country-specific algorithms for allocation of available organs.

In the Eurotransplant system, transplant kidneys are allocated

1. on the basis of histocompatibility criteria, and
2. according to the patient's immunisation status and waiting time.

This allocation procedure is widely accepted in Europe, as there is a large body of data demonstrating the superior role of histocompatibility in early and late graft survival. In Germany, children under the age of 18 years are given priority in organ allocation due to the risk of physical and psychological developmental disorders during dialysis therapy. Today, the goal of early transplantation of a deceased kidney cannot be achieved in many cases due to the high number of dialysis patients, the decreasing willingness of the population to donate organs and the resulting increase in the waiting time until transplantation.

HLA matching

It is important to ensure a good HLA match,

- relevant for the longest possible kidney graft survival,
- relevant to avoid HLA sensitisation for a second or third transplant that may be required in the future,
- a good HLA match also allows for less intensive drug immunosuppression, thus avoiding infectious and oncological complications such as post-transplant lymphoproliferative disorder (PTLD),
- kidney transplants with 2 mismatches at the HLA-DR locus should only be accepted in exceptional cases.

Donor age

Deceased donation: Long-term data show that transplantation of donor kidneys from older deceased donors > 50 years is associated with poorer graft survival, so that, if possible, only a donor kidney from a deceased donor < 50 years should be accepted for a paediatric recipient. However, this principle is not always adhered to, as the average age of organ donors in Germany is steadily increasing and the number of organ donors is decreasing.

Living donation: The age limit of 50 years does not apply to living donors, and after careful selection of kidney-healthy living donors, possibly also grandparents, quite good long-term results can be achieved.

Young paediatric donors: The extent to which donor organs from young children < 5 years of age should be accepted for paediatric recipients is controversial, as transplantation of these very small organs into young recipients is associated with an increased rate of arterial and venous thrombosis due to difficult vascular anastomoses in anatomically small vessels, which may lead to early organ loss. Ultimately, the success of such high-risk transplants depends on the vascular surgical expertise of the transplant surgeon.

According to Eurotransplant guidelines, kidneys from paediatric donors aged < 2 years must be removed *en bloc*, and *en bloc* removal is recommended for donors aged between 2 and < 5 years. Some transplant surgeons recommend a recipient with a body weight of 20–50 kg for *en bloc* kidney transplantation, as smaller or larger recipients may have less favourable outcomes. In experienced centres, *en bloc* kidneys are often split into two kidneys that can be used for two smaller recipients.

3 Listing for living donation

Currently, about 30% of kidney transplants in children and adolescents up to the age of 18 years in Germany are performed with kidneys from living donors, usually the parents. Donations from other related and unrelated people who have a close emotional relationship with the recipient are also possible. This law is currently under review in Germany with the intention of changing to less stringent rules. Recently, the trend towards living donation has increased.

Transplantation of a kidney from a living donor has the following advantages over transplantation from a deceased donor:

- the donor is usually young and healthy,
- the procedure can be well timed,
- the immunological tolerance is usually better than with a deceased kidney because of the haploidenticality of parent and child, so the intensity of the immunosuppressive drug regimen and consequently their side effects are lower,

- there is no need for prolonged preservation of the organ; so the structure and function of the graft are better preserved.

These factors contribute to the fact that 5-year graft survival after living kidney donation is about 10% better than after deceased kidney donation. The average kidney graft survival (half-life) after deceased donation is currently about 19 years, which is about 5 years shorter than the graft survival after living donation (currently about 24 years). In addition, living donor transplantation can be more easily performed pre-emptively (before the need for dialysis therapy), thus avoiding potential dialysis-related complications.

The advantages of living kidney donation are offset by the surgical risk for the donor, although this is very low (see chapter 1.4). The perioperative mortality risk associated with living kidney donation is very low, at 0.03%. After kidney donation, the donor's kidney function is about 80% of baseline. Therefore, annual follow-up of living donors is mandatory in order to detect renal dysfunction or arterial hypertension in time. Annual follow-up includes a 24-hour ambulatory blood pressure monitoring, kidney function testing, protein excretion, sonography of the remaining autologous kidney, quality of life questionnaires or counselling, and psychological support if needed.

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