

CHAPTER 1

Preparation for kidney transplantation

CHAPTER 1.1 Superiority of kidney transplantation vs. chronic dialysis, indications and contraindications

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

ORCID:

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

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

1 Superiority of kidney transplantation as renal replacement therapy

Chronic dialysis therapy in children and adolescents is associated with a number of complications. In chronic home peritoneal dialysis, the patient is usually confined to the cyclor machine for 8–12 hours each night and cannot participate in normal evening leisure activities during adolescence. Chronic in-centre haemodialysis therapy requires the patient to travel to a paediatric dialysis centre, usually far away, for several hours at least 3 times a week, resulting in long periods of absence from school and other activities. Dialysis therapy puts a lot of strain on the circulatory system. Even a good dialysis therapy usually cannot guarantee more than 15% of normal kidney function. As a result, the paediatric dialysis patient has chronic uraemia with a variety of secondary complications, such as

- Growth impairment,
- CKD mineral bone disease,
- Renal anaemia,
- Metabolic acidosis,
- Accelerated atherosclerosis leading to an increased rate of cardiovascular complications from an early age,
- Impaired psychosocial development,

- Inferior quality of life,
- Impaired educational and employment outcomes in children and adolescents.

The survival benefit of kidney transplantation compared to dialysis therapy is demonstrated in a recent analysis of the ERA registry of adult outcomes of childhood kidney replacement therapy in Europe from 2008 to 2019 [1]. Dialysis patients had a higher risk of death than kidney transplant recipients (adjusted hazard ratio 5.44 (95% CI: 3.34–8.86)). Compared with the general population, life expectancy for eighteen-year-old kidney transplant and dialysis patients was 17 and 40 years shorter, respectively.

In addition, the quality of life after successful kidney transplantation is significantly better than during chronic dialysis treatment: patients can lead an almost normal life, with only a few restrictions in daily life apart from the necessary medication intake and outpatient visits. Growth and physical development are also almost normal if the transplant is successful.

2 Indications and contraindications for kidney transplantation

In terms of the size required for a child to be considered for a kidney transplant, most transplant centres require a body weight of at least 8–10 kg, otherwise the graft cannot be safely placed for anatomical reasons. However, in rare cases, recipients weighing 4–6 kg are accepted by specialised centres, for example if chronic dialysis is associated with significant complications or is not technically feasible. In these rare cases, a kidney from a deceased child donor can be transplanted.

In principle, ABO blood group incompatibility is no longer an immunological contraindication (see Chapter 5.3); the long-term results are similar to those after ABO blood group compatible transplantation. However, depending on the level of ABOi antibody titres, the organ recipient may require conditioning treatment by antigen-specific immunoadsorption prior to transplantation to remove the blood group antibodies in the recipient. Immunoadsorption is less problematic in older children than in infants due to the device-related extracorporeal volume. In addition, current protocols for ABO blood group incompatible living kidney donation include more intensive immunosuppressive induction therapy with the B-cell depleting antibody rituximab, which may increase the risk of

infection. These factors make ABO blood group transplantation less desirable as first choice.

Absolute contraindications to kidney transplantation:

- ongoing infectious diseases,
- malignant diseases that have not been treated curatively,
- serious comorbidities (e.g., cardiovascular, bronchial, pulmonary and liver disease) that either pose a life-threatening risk during transplantation or jeopardise the long-term success of the transplant.
- In the case of children with a severe physical or mental handicap, an indication for transplantation should be considered after careful assessment of the expected overall life expectancy.

References

- 1 Montez de Sousa IR, Bonthuis M, Kramer A, et al. Adult outcomes of childhood kidney replacement therapy in Europe from 2008 to 2019: an ERA Registry study. *Nephrol Dial Transplant*. 2024 Aug 24:gfae189.
- 2 Tönshoff B, Becker JU, Pape L. Nierentransplantation, pp. 243–74. In: *Nierenerkrankungen im Kindes- und Jugendalter*, Dötsch J, Weber LT (Hrsg.), Springer Berlin, 2024