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# COMPLICATIONS AND OUTCOMES IN KIDNEY TRANSPLANTATION: A SINGLE-CENTRE EXPERIENCE AT QUEEN RANIA HOSPITAL

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## ABSTRACT

**Objective:** to study the surgical and medical complications that arise following renal transplantation, with a focus on their incidence, risk factors, and potential outcomes in pediatric patients at Queen Rania Children's Hospital. **Method:** This study is a retrospective analysis of the medical records of pediatric patients aged 4–15 who underwent renal transplantation at Queen Rania Children's Hospital in Jordan between 2018 and 2024. The study included demographic data, primary disease, hemodialysis status, and immunosuppressive medication, including both induction and maintenance therapy. **Results:** The study included 50 patients of pediatric renal transplant recipients, 34% of them previously had ESRD due to congenital anomalies of the kidney and urinary tract (CAKUT). Additionally, 32% of the patients had familial Focal Segmental Glomerulosclerosis (FSGS) as the primary cause of their condition. Infectious complications were the most common cause of increased in morbidity post-transplant (66.6 %), while surgical complications accounted for only 12.5 % of cases. 18% of patients had Preemptive transplantation. At follow-up,90% of patients maintained stable graft function, while only 5 patients experienced graft deterioration due to chronic T-cell-mediated rejection, recurrent FSGS, acute cellular rejection, or C3 glomerulopathy. **Conclusion:** Following renal transplant, medical complications, particularly infections, were the most common, whereas surgical complications were less frequently documented. The majority of patients maintained stable graft function; however, some experienced graft deterioration due to rejection or disease recurrence.

**KEYWORDS:** CAKUT, COMPLICATION, FSGS, pediatric kidney transplant.

## INTRODUCTION

Chronic kidney disease (CKD) in children is a progressive condition associated serious long-term health consequences and significant increase in morbidity. It affects growth, neurocognitive development, and the cardiovascular system, so it often requires multidisciplinary care.[1] Among pediatric patients, approximately 50% of CKD cases are attributed to congenital anomalies of the kidney and urinary tract (CAKUT), which eventually lead to end-stage kidney disease (ESRD).[2] At these stages, renal transplant is the optimal and most effective treatment strategy, offering higher survival rates, better quality of life, and superior developmental outcomes compared to long-term dialysis.[3] Pediatric patients usually face special challenges in the post-transplant period, because they are different physically than adults and have different developmental requirements. While advances in surgical techniques and immunosuppressive therapies have significantly improved outcomes, some complications remain a major concern in the post-transplant period. Such complications vary widely and range from acute rejection and infections to growth disturbances and medication-related side effects that do not only threaten graft survival but also impact the child's overall development and psychosocial well-being.[4,5]

The incidence and severity of such complications are often influenced by the primary underlying cause of their ESRD, the immunological status of the patients, donor characteristics, and the type of the immunosuppressive therapy.[5]

Understanding the spectrum of post-transplant complications in pediatric patients and knowing the main cause and clinical manifestations is important to enhance long-term outcomes and tailoring individualized strategies for prevention and management. which will lead to improved graft survival, reduced rejection rates, refined surgical techniques, and an evolution in immunosuppressive therapies.[6]

Despite the global efforts to improve kidney transplant outcomes in pediatric patients, still there is a lack of regional data in Jordan and the Middle East.

This study aims to address this gap by providing a retrospective analysis of medical and surgical complications following kidney transplantation in pediatric patients treated at Queen Rania Hospital for children between 2018 and 2024 by exploring the associations between post-transplant complications, primary disease, and immunosuppressive therapy, offering an insight into clinical outcomes and contributing to the regional and global understanding of pediatric renal transplantation.

## MATERIAL AND METHODS

This is a retrospective observational study that was conducted at Queen Rania Children's Hospital in Jordan. The medical records of 50 pediatric patients who underwent renal transplantation between January 2018 and August 2024 were reviewed. The main goal was to assess demographical characteristics, underlying etiology of their renal disease, dialysis history, patient-donor relationship, immunosuppressive treatment protocols (induction and maintenance), and post-transplant complications.

Ethical approval was obtained from the Institutional Review Board (IRB) of the Jordanian Royal Medical Services.
The study cohort included pediatric patients aged between 4 and 15 years who underwent kidney transplantation throughout the specified period.

A total of 53 cases were initially identified and meant to be included in this study; however, three patients were excluded due to inadequate clinical documentation, giving a final sample size of 50 participants.

Inclusion criteria required patients to be between 4 and 15 years of age at the time of transplantation; they also had to have the operation done at Queen Rania Children's Hospital within the defined timeframe and to have full, completed follow-up data available in the Hakeem electronic health record system, including detailed records of immunosuppressive therapy and post-transplant outcomes. Patients were excluded if they had missing or incomplete clinical data, fell outside the specified age range, or underwent transplantation outside the designated period or institution.

Data were extracted from the Hakeem system, a nationally integrated electronic health record platform used across Jordanian Royal Medical Services hospitals.
The data collection included patients age, gender, primary diagnosis, dialysis modality and duration, transplant date, patient-donor relationship, blood group compatibility, immunosuppressive medications (both induction and maintenance), and post-transplant complications. As per institutional policy, informed consent for research use was considered granted by default upon patient registration in the Hakeem system.

All data had been gathered in Microsoft Excel and analyzed using descriptive statistical methods. Categorical data were presented as frequencies and percentages, while continuous variables were reported as means ± standard deviation (SD) or medians with interquartile ranges (IQR), depending on the distribution of the data. The alpha level of significance was set at 0.05.

## 3. RESULTS

### 3.1 Patient Demographics and clinical background

A total of 50 pediatric patients who underwent renal transplantation at Queen Rania Children's Hospital were involved in this study.

Within the cohort, 56% of the participants were males and 44% were females. The average age of the patients was 12.3 ± 2.8 years; most of them were between 10 and 14 years old.

The majority of donors were first-degree relatives of the patients, with maternal donors accounting for 60% of cases, while paternal donors were 30%, and just 10% were siblings or unrelated people. Donors' ages ranged from 30 to 40 years. All transplants were ABO-compatible, and HLA matching ranged from 50% to 75%, depending on donor availability and immunologic risk.

Congenital Anomalies of the Kidney and Urinary Tract (CAKUT) were the leading cause of ESRD, which was observed in 34% of patients, followed by familial Focal Segmental Glomerulosclerosis (FSGS), which was seen in 32% of them. Reflux nephropathy, hypoplastic kidneys, congenital nephrotic syndrome, and C3 glomerulopathy were among the other causes. 82% of patients had dialysis before transplant, 66% of them had hemodialysis, and 16% had peritoneal dialysis.

On the other hand, 18% of the patients underwent preemptive transplantation without prior dialysis, and

this subgroup demonstrated favorable early graft outcomes.

3.2 Immunosuppressive Management

Methylprednisolone and basiliximab were given to all patients as induction treatment. Tacrolimus and mycophenolate mofetil (CellCept) were used in 95% of cases for maintenance immunosuppression. Just a minority of them received cyclosporine (Neoral), based on their immune system profiles and how well they could tolerate these medications. Steroid tapering started during the first three months after transplantation, with complete withdrawal achieved in selected low-risk patients.

3.3 Post-Transplant Complications, Immunologic Events, and Graft Outcomes

Following renal transplant, several medical, surgical, and immunological complications were noted in a significant proportion of the participants. In general, 58% of the patients experienced at least one complication; 48.2% of them had more than one complication.

among all complications, medical complications were the most prevalent, accounting for 87.5% of all reported events, with infectious complications representing the largest subgroup (66.6 % of the total complications).The most frequently reported infections included; polyomavirus, which accounted for 37.5 % of the infectious complications(25% of the total complications), followed by Epstein–Barr virus (EBV) reactivation (25%), then cytomegalovirus (CMV) infection (18.7%), and varicella zoster which accounted for 6.2 % of the total infectious insults, while bacterial urinary tract infections accounted for 12.5%.

However, surgical complications were less common, affecting only 12.5 % of patients, including urinoma, seroma, fistula and postoperative intestinal obstruction. At the latest follow-up visits, 90% of the patients had maintained stable graft function, normal serum creatinine levels and preserved estimated glomerular filtration rate (eGFR). However, graft deterioration and immunological complications were observed in 16% of patients, for example, acute cellular rejection was observed in 2 patients, chronic T-cell–mediated rejection was seen in 1 patient, and recurrence of primary renal disease, In particular, two patients experienced focal segmental glomerulosclerosis (FSGS) recurrence following transplant, and another one developed recurrent C3 glomerulopathy within the first year following transplantation. Two patients had cellular rejection graft failure, which necessitated the initiation of dialysis again, while another experienced systemic complication that required an extended hospitalization. In general, these findings show that, while most patients had a stable graft function post-transplant. However, monitoring for complications is still important to optimize long-term outcomes.

## DISCUSSION

This study provides an overview of pediatric renal transplantation outcomes at Queen Rania Children's Hospital. The overall findings were promising, as most of the patients had good prognosis and high graft survival rates, which reached 90%. In general, serious complications were relatively uncommon, and these results align with the international results that were reported in previous multicenter pediatric transplant cohorts. [7]

The cohort included mostly male patients around 12 years old, and in most cases, the donors were first-degree relatives, particularly maternal donors, which is consistent with what was noticed in other centers but not unusual in pediatric transplants. It also reflects regional sociocultural dynamics and may contribute to improved immunologic compatibility and early graft outcomes.[7-9]

The most common causes of end-stage renal disease (ESRD) were congenital anomalies of the kidney and urinary tract (CAKUT) and familial focal segmental glomerulosclerosis (FSGS), which matches the international data that identify these conditions as common indications for pediatric transplantation.[10]

18% of the cases had preemptive transplantation before any need for dialysis, and that was associated with favorable early graft outcomes. This supports existing literature suggesting that avoiding dialysis prior to transplantation may reduce sensitization and improve long-term graft function.[10-11], which subsequently addresses the need for earlier referral and planning in children with worsening ESRD who need renal transplantation.[12]

After transplant, 58 % of patients had some kind of complication, with medical complications being the most frequently reported type of complication. On top of them, infections were the main concern. Viruses like polyomavirus, EBV, and CMV were common, which was also reported in the previous international studies and is not surprising and will remain a significant concern due to the strong immunosuppressive medications these patients had to take.[12,13,14]

A few children had immunological complications, like rejection and recurrence of the primary disease, 2 patients had FSGS back in less than two years after transplant, and another one had C3 glomerulopathy return within the first year. As these conditions are known to have high recurrence rates, these cases were not unexpected.[14-15]

While the reported outcomes are promising, this study has a few limitations, such as the single-center design and relatively small sample size, which may limit its generalizability. Also, the follow-up period mainly asses early and intermediate outcomes; longer-term data are

needed to evaluate chronic graft function, late complications, and patient survival.

## CONCLUSION

This is a retrospective observational study that provides a comprehensive evaluation of the clinical outcomes and complications of renal transplantation at Queen Rania Children's Hospital. Most patients sustained stable graft function and good clinical outcomes; both surgical and immunologic complications occurred at relatively low rates.

These results show that with careful planning, skilled surgical teams, and personalized treatment, kidney transplants can be safe and effective.

The most frequently reported complications were infections. However, they were generally well controlled by proper monitoring and management. Immune-related complications like graft rejection and disease recurrence were less common, but still serious and need close follow-up, tailored immunosuppression, and early recognition and prevention.

In general, kidney transplantation at Queen Rania Children's Hospital is showing promising results. However, more multicentric research with larger samples and longer follow-up periods would be helpful to confirm these findings and guide future care plans.

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### Authors' Contributions

All authors contributed equally to the conceptualization, design, data collection, analysis, and interpretation of the research, as well as the writing and revision of the manuscript. All authors have read and approved the final version of the manuscript.

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### Conflict of interest

The author declared no competing interests.

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