Non-kidney infections are a major factor in 5-year kidney graft loss in a transplant population at low risk for cardiovascular disease.

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Background

Kidney transplantation is the World's most common renal replacement therapy (RRT). In under-resourced countries cardiovascular events is low. Nevertheless, one- and 5-year graft survival closely resembles that of living donor transplants in developed countries, where cardiovascular disease (CVD) death is a major cause of graft loss.

Material and method

- This study evaluates kidney transplants performed in the Sulaimania Governate of Iraq from 2015 through 2019 and followed-up through 2021.
- There were 656 patients.
- Outcomes consisted of return to HD (RHD), death with a functional graft (DWFG), all graft loss (RHD+DWFG), and all death.
- Infections were recorded as pyelonephritis, PCR+ BK viremia (BKV), biopsy demonstrated BK nephropathy (BKN), PCR+ COVID-1, and non-kidney-deep infections (NK-deep infections),.
- NK-deep infections consisting of non-COVID pneumonia, septicemia, gastrointestinal infections, and hepatitis.
- Logistic regression tested the relationships between clinical characteristics, infections, and graft outcomes

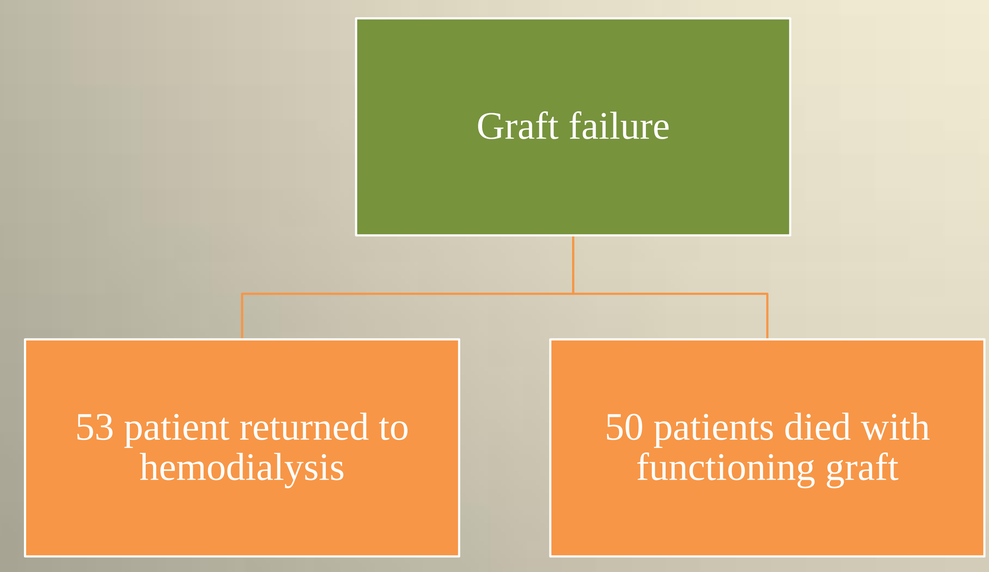
Results

- Table 1: clinical characteristic of recipient:

Characteristic	Value
Total number of recipients, n (%)	**656 (100)**
Average age of recipients (yr)	39.2±14.0
Under 50 years old (%)	75%
Above 65 years old (%)	3.5%
History of diabetes (%)	19.7%
BMI ≥ 30 (%)	11.7%
Living/Deceased donor, %	**100%**
First time transplant, %	96%

Abbreviations: Continuous variables of age is expressed as mean ±SD. BMI, body mean index

Graft failure flow chart:



- Sixty-eight patients died, 41 of infection, 14 of CVD, and 13 of other or undetermined cause.
- For RHD, 16 patients died on dialysis (DOD), 13 of NK-deep infections.
- For DWFG, 17 had NK-deep infections. NK-deep infections consisted mainly of bacterial pneumonia and septicemia.
- In 4 patients, the septicemia complicated implantation wound infections and in 2 patients intensified immunotherapy for recurrent disease (Table 2).

Table 2: Non-kidney deep infections with the outcome and time in months post-transplantation

Infection	number	outcome	Time post-Tx (mo)
Bacterial pneumonia	9	6DWFG, 3DOD	10(2.5-15.7)
Septicemia all	13	6 DWFG, 6 DOD	3 (1.6-21.0)
Septicemia, 2^0 wound infection	4	2 DWFG, 2DOD	1.1 (0.2-2.5)
Septicemia, 2^0 intensive therapy	3	3 DOD	2 (0.7-2.8)
Viral pneumonia, non-COVID	2	1 CMV, 1 herpes	10, 40
Pulmonary TB	2	1 DWFG, 1 DOD	4, 5
HCV+ liver failure	2	2 DWFG	6, 17
Intestinal infarction, peritonitis	1	DOD	34
Gastroenteritis	1	DWFG	8

Abbreviations: DWFG, death with functioning graft; DOD, death on dialysis; TB, Mycobacterium tuberculosis; mo, months; CMV, cytomegalovirus; Tx, transplantation; Timepost-Tx is the median and interquartile range (IQR) with 3 or more entries

- Pyelonephritis affected 79 patients, and 37 patients had BKV with BKN in five.
- One pyelonephritis and 3 BKN progressed to dialysis.
- Two BKN resolved, but both patients DWFG, one of fungal sepsis and one of CVD.
- COVID infected 211 patients, with 11 deaths (5.2%), 2 DOD and 9 DWFG.
- DWFG was attributed to infections in 26 patients (17 NK-deep infections and 9 COVID), CVD in 11 patients, and other cause in 13 patients.
- NK-deep infections were all fatal and were the most significant variable affecting all graft loss (NK-deep infectio, OR=233.1, 30.4-1786.6, p<0.001; age, p=0.85; BMI, p=0.24; diabetes, p=0.16; pyelonephritis, p=0.21; BKV, p=0.38; COVID, p=0.28).

Discussion

- Nearly all transplant pyelonephritis resolved, while all BKN was associated with graft loss in part indirectly by DWFG.
- COVID was responsible for 18% of DWFG, but it was NK-deep infections causing pneumonia and septicemia that had the greatest influence on graft loss.
- With COVID, NK-deep infections caused 52% of DWFG and exceeded CVD by a factor of 2.4:1.
- Over 5 years, the rate of graft loss was 18.6% (95%CI, 15.3-22.5%) .
- This rate does not seem excessive and is probably an unavoidablecomplication of the immunosuppression needed to control rejection.

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