ORIGINAL ARTICLE

Allocation of renal grafts to older recipients does not result in loss of functioning graft-years

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Abstract

Background: Most deceased donor kidney allocation protocols are based on waiting time and do not take into account either recipient's life expectancy. This study investigates whether graft survival is affected by patient life expectancy.

Methods: A total of 640 adult kidney transplants were performed. Recipients were divided in group A (patients ≤ 50 years) and group B (patients > 50 years). The status of graft+recipient combination was characterized as: a) deceased recipient with functional graft, b) alive recipient with functional graft and c) deceased or alive recipient with non-functional graft.

Results: Mean kidney recipient survival was 15.15 (95% CI: 14.54, 15.77) and 12.40 (95% CI: 11.47, 13.33) years for groups A and B respectively ($p < 0.0001$). Mean graft survival was 13.62 (95% CI: 12.81, 14.43) and 12.42 (95% CI: 11.59, 13.25) years for groups A and B respectively (p=0.6516). Non-functional grafts were identified in 18.4% (n=57) and 16.4% (n=54) of group A and B respectively.

Conclusions: Allocation of renal grafts to older patients does not result in significant loss of graft-years. Recipients' life expectancy has a small impact on graft survival. We should not deviate from the basic principles of equality, when kidney allocation systems are designed. Hippokratia 2011; 15 (2): 167-169

Key words: waiting list, equality, utility, outcomes, survival

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Kidney allocation remains one of the most controversial subjects in solid organ transplantation. The debate about which recipient receives what organ is stronger than ever, especially since more and more patients, who were previously not considered viable candidates for receiving a graft, are currently added to the deceased donor renal transplantation waiting list[1].

As far as United Network for Organ Sharing (UNOS) is concerned, most deceased donor kidney allocation protocols are based on waiting time[2]. These methods do not take into account either recipient's life expectancy (both on dialysis and after transplant) or the quality of the graft. That means that deceased donor kidneys with long expected function times, i.e. standard criteria donor (SCD) grafts, might be allocated to patients with short life expectancy or kidneys with short expected function times, i.e. extended criteria donor (ECD) grafts, might be matched with young, otherwise healthy, recipients. This thought process together with a stipulation in federal regulation that organ allocation should strive to maximize lifetime benefit led to the development of quantitative survival benefit driven schemes[3,4] in an effort to improve placement of kidneys.

On the other hand, the trade-off for the implementation of a quantitative survival benefit allocation system is equity, meaning that placement of grafts to older recipients (the ones with short life expectancies) will decrease dramatically[1]. Furthermore, there is significant evidence that quantitative allocation plans might not have the expected profound effect on young recipient survival curves or that placement of ECD grafts is not detrimental to a young patient's expected survival in many circumstances[5].

This study reports renal recipient actuarial survival stratified by age and by graft quality. It also investigates whether graft survival (either SCD or ECD) is affected by patient survival curves.

Patients and methods

This is a single center, retrospective study of prospectively collected data. Between 1990 and 2006, 640 primary adult kidney transplants were performed. Retransplants and multi-organ recipients were excluded. The transplanted patients received either an SCD (n=414) or an ECD (n=226) graft, according to UNOS classification[6]. The recipients were divided in two groups, according to their age: group A that included patients ≤ 50 years old and group B that included patients > 50 years old. The combination of graft+recipient status was allocated into three categories: deceased recipient with functional graft, alive recipient with functional graft and deceased or alive recipient with non-functional graft. Graft actuarial survival (censored for patient death) was calculated, adjusted for patient age-group and stratified by graft ECD-status. The prevalence of the three graft+recipient status categories within the four patient age-groups was also studied. Finally, the incidence of acute cellular rejection (ACR), adjusted for patient age-group, was calculated too. The SPSS version 16.0 was used for statistical analysis.

Results

Three hundred and ten patients (48.44%) comprised group A, whereas 330 patients (51.66%) comprised group B. Mean kidney recipient survival was 15.15 (95% CI: 14.54, 15.77) and 12.40 (95% CI: 11.47, 13.33) years for groups A and B respectively (Figure 1). That was statistically significant ($p < 0.0001$). Even after stratification according to graft ECD-status, group A exhibited better patient survival than group B (Table 1).

Mean graft survival was 13.62 (95% CI: 12.81, 14.43) and 12.42 (95% CI: 11.59, 13.25) years for groups A and B respectively (Figure 2). That was not statistically significant (p=0.6516). Even after stratification according to graft ECD-status, group A and group B showed similar graft survivals (Table 1).

Alive recipients with functional grafts were identified in 75.8% (n=235) and 68.8% (n=227) of groups A and B respectively. Deceased recipients with functional grafts were identified in 5.8% (n=18) and 14.8% (n=49) of groups A and B respectively. Finally, non-functional grafts (in alive or deceased recipients) were identified in 18.4% (n=57) and 16.4% (n=54) of group A and B respectively.

The incidence of ACR was 21% (n=65) and 12% (n=40) for groups A and B respectively. That was statistically significant (p=0.003).

Table 1: Patient and graft survival in patients ≤ 50 (group A) and > 50 (group B) years of age after stratification according to graft ECD-status. Notice that CI overlapping (absence of statistical significance) occurs for graft but not for patient survival values.

PATIENT SURVIVAL				
	SCD graft Recipient		ECD graft Recipient	
Patient's age	*Value (years)*	*95% CI*	*Value (years)*	*95% CI*
≤ 50 years	15.22	14.54, 15.89	14.97	13.55, 16.39
> 50 years	12.65	11.47, 13.82	10.74	9.74, 11.74
GRAFT SURVIVAL				
	SCD graft Recipient		ECD graft Recipient	
Patient's age	*Value (years)*	*95% CI*	*Value (years)*	*95% CI*
≤ 50 years	13.66	12.8, 14.51	12.93	11.12, 14.74
> 50 years	13.13	12.12, 14.14	10.43	9.32, 11.55

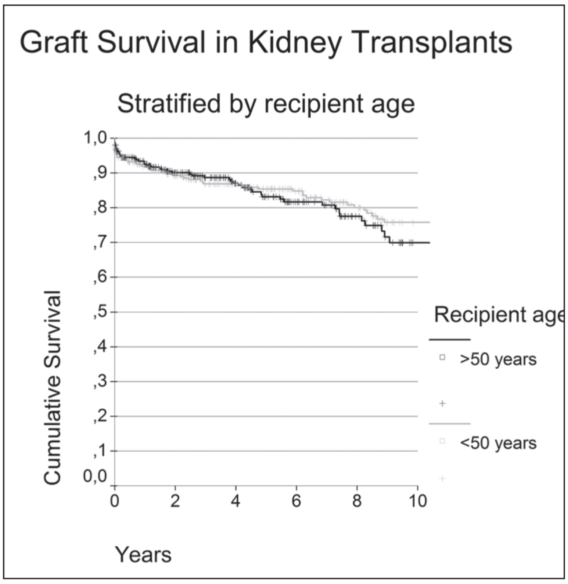

Figure 1: Patient survival in kidney transplants stratified by recipient's age. The trends are similar even when maximum follow-up is 15 instead of 10 years (data not shown).

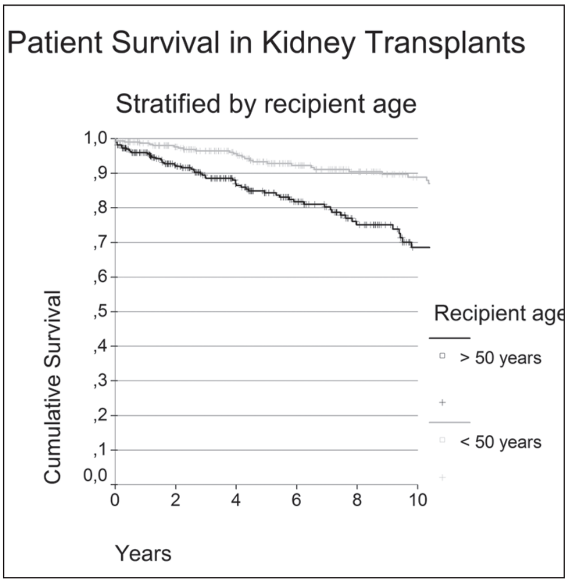

Figure 2: Graft survival in kidney transplants stratified by recipient's age. The trends are similar even when maximum follow-up is 15 instead of 10 years (data not shown).

Discussion

In our patient population, the older recipients (> 50 years) show inferior patient survival curves when compared to the younger ones (≤ 50 years). Of course, this is an expected finding. What is surprising is that despite their shorter life expectancy, older recipients have similar graft survival curves when compared to the younger ones. To be more precise, difference of almost four years in mean patient survival yields a mere difference of approximately one year in mean graft survival, regardless of graft ECD-status. This is also reflected to the almost similar percentage of alive recipients with a functioning graft between older and younger patients (69% and 76% respectively). One possible explanation is that, the higher incidence of ACR (almost double) in recipients ≤ 50 years of age, causes faster graft function "deterioration" in the younger population, and offsets the advantage of placing a kidney graft to patients with higher life expectancy.

However, there is another way of analyzing the same results. In a hypothetical allocation of all the grafts utilized by our center to recipients ≤ 50 years old, the 10-year graft survival would be 74%. If all ECD grafts were given to recipients > 50 years old and all SCD grafts were given to recipients ≤ 50 years old, the 10-year graft survival would be 68%. Both these scenarios compare favorably to the present situation (free allocation, regardless recipients age) where the 10-year graft survival is 62%. Of course, under no circumstances the waiting list of a transplant center consists of young patients only. Furthermore, in a quantitative allocation scheme we should take into consideration what would happen to the "other side of the fence", i.e. what would happen to the older patients waiting on the list for a graft, while the younger ones are prioritized. A possible solution to this problem would be to analyze not only recipient survival curves but also enlisted patient (waiting and transplanted) survival curves.

In conclusion, allocation of renal grafts to older patients does not result in significant loss of graft-years. Recipients' life expectancy has a small impact on graft survival. Although a different, more quantitative, allocation system might be better, we should not deviate from the basic principles of equality, especially since patients considered for renal transplantation do not face immediate risk of dying and kidney transplantation, unlike other organs (i.e. liver, heart, e.t.c.), does not have an imposing life or death imperative[1,7].

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