

Left-sided Donor Nephrectomy Predisposes Living Kidney Donors to Latent Adrenal Insufficiency with Symptoms of Fatigue and Inferior Quality of Life

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INTRODUCTION

It took some decades to establish living kidney donation as a routine clinical procedure in Germany being only rarely carried out until the early 1990s. The enormous increase in the number of living kidney donations has been attributed to the increasing waiting time, ABO incompatible transplantation, and a liberalization of organ donor criteria. Numerous studies assessing the long-term health outcome of living kidney donors suggest minimal health risks with very low risk of ESRD. However, donors, who constitute a highly selected sample, might develop health problems that would not have occurred if they had refrained from donating a kidney. These complications particularly include the development of post-donation hypertension and symptoms of tiredness and fatigue.

PATIENTS AND METHODS

Cross-sectional study: We retrospectively analyzed all living kidney donors undergoing donor-nephrectomy between 1998 and 2013. We performed a questionnaire-based survey using the standardized short form-8 questionnaire (SF-8). In addition, an open questionnaire was used to address for short- and long-term medical complications. In total, 215 of 256 completed the questionnaire and could therefore be included in the analysis, which constitutes a response rate of 84%. The main objectives of our retrospective study were: (1) What impact does living kidney donation have on quality of life? (2) What factors predispose living kidney donors to impairment of quality of life? (3) What factors predispose living kidney donors to hypertension and symptoms of chronic fatigue?

Prospective study: We prospectively performed a study of 27 living kidney donors undergoing donor-nephrectomy between 2014 and 2015. Morning cortisol and ACTH levels were performed at baseline and +6 months post donation. Data were compared between right- and left-sided donation. Due to the observed impact of donor kidney side on quality of life, we hypothesized that left-sided donor nephrectomy may predispose donors to impairment of the left adrenal gland.

	PCS above average (n=73)	PCS at average (n=72)	PCS below average (n=70)	P value
Age, yr	53 (27-78)	54 (38-74)	50 (28-75)	0.034*
Male, n (%)	27 (37)	23 (32)	22 (31)	0.737
Right side, n (%)	40 (55)	28 (39)	25 (36)	0.011*
Late complications, n (%)				
Psychological problems	2 (3)	7 (10)	20 (29)	<0.001*
Chronic pain	0 (0)	12 (17)	28 (40)	<0.001*
Tiredness/chronic fatigue	3 (4)	13 (18)	21 (30)	<0.001*
Pain drugs, n (%)	5 (7)	20 (28)	33 (47)	<0.001*
Hypertension				
Onset pretransplant	11 (15)	17 (24)	12 (17)	0.388
Onset posttransplant	19 (26)	19 (26)	23 (33)	0.598
Not willing to donate again, n (%)	1 (1)	5 (7)	15 (21)	<0.001*
Physical Component Score (PCS)	56.68 (54.32-62.51)	49.93 (44.69-53.44)	37.46 (18.62-44.34)	-
Mental Component Score (MCS)	57.48 (26.82-60.17)	52.4 (17.15-61.14)	48.62 (12.11-68.57)	<0.001*

	Living donors after left-sided nephrectomy (n=120)	Living donors after right-sided nephrectomy (n=95)	P value
Age, yr	53 (27-75)	53 (32-78)	0.662
Male, n (%)	39 (35)	33 (33)	0.772
Late complications, n (%)			
Psychological Problems	19 (16)	10 (11)	0.016*
Chronic pain	28 (23)	12 (13)	<0.001*
Tiredness/chronic fatigue	27 (23)	10 (11)	<0.001*
Postdonation Hypertension	26 (22)	35 (37)	0.015*
Physical Component Score (PCS)	53.23 (25.76-62.51)	47.29 (18.62-60.74)	0.001*
Mental Component Score (MCS)	55.19 (12.11-68.57)	52.59 (17.15-66.34)	0.135

RESULTS

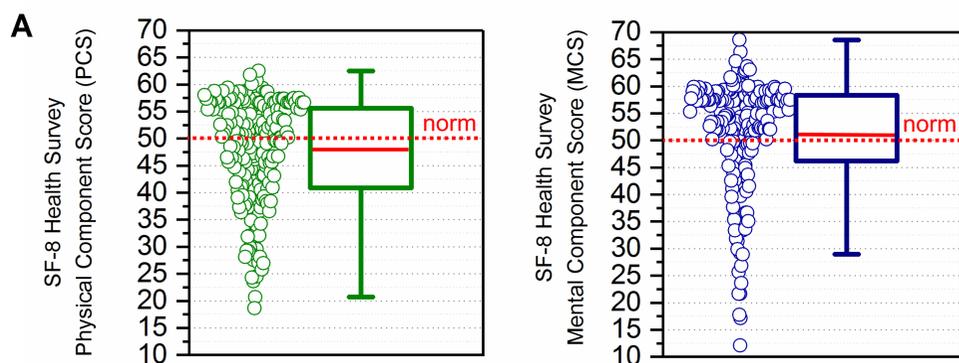
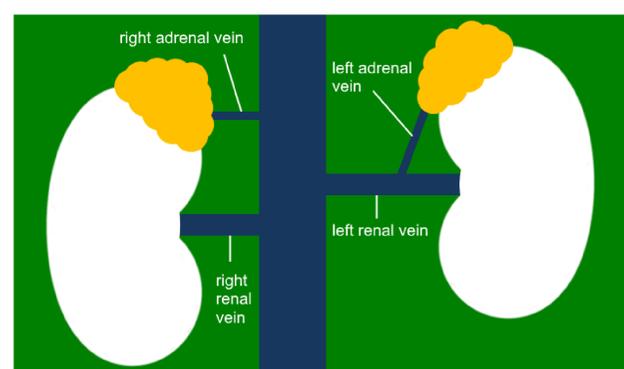


Figure 1A PCS of our living kidney donors were slightly lower but comparable with the general population norm. Similarly, living kidney donors showed slightly higher comparable MCS compared with the general population norm. Scoring was used to classify donors on quality of life in 3 groups: donors with PCS/MCS 1 SD above average, those with PCS/MCS at average, and those with PCS/MCS 1 SD below average.



During living donor nephrectomy the renal artery and renal vein are transected as far away from the kidney as possible, to ensure an adequate vessel length. While the right-sided adrenal vein drains directly into the inferior vena cava, the left-sided adrenal vein drains into the renal vein and may be injured during surgery, scarring or anatomical adaptations.

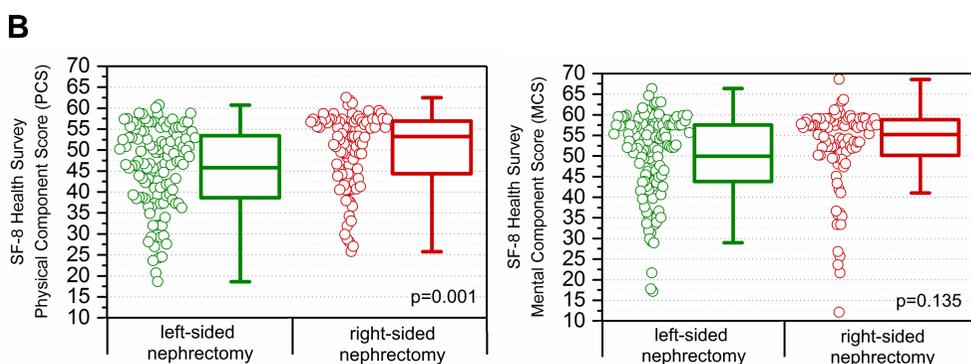


Figure 1B Donors after left-sided nephrectomy showed significantly lower PCS compared to donors of a right kidney. Although the difference for the MCS didn't reach statistical significance, it showed a tendency for lower MCS after left-sided nephrectomy.

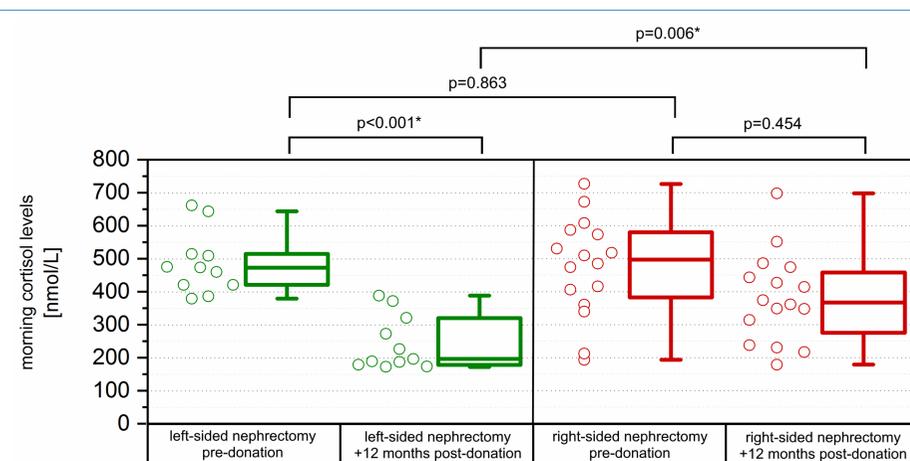


Figure 2: No differences were observed for morning cortisol levels between right-sided and left sided donors prior to donation. However, right-sided donors were more likely to show stable morning cortisol levels from pre to +6 months post-donation, while left-sided donors showed a decline of morning cortisol levels 6 months post-donation. No differences were observed for ACTH levels at any time between both groups.

CONCLUSIONS

- Our results indicate that living kidney donation has an impact on physical and mental quality of life in long-term follow-up. Here, the impairment on quality of life is characterized by the presence of long-term complications.
- Our results strongly indicate that the side of donor nephrectomy has major impact on physical and mental quality of life in long-term follow-up.
- Impaired function of the left adrenal gland due to injury of adrenal vessels may be an explanation for the higher incidence of symptoms of tiredness fatigue and less hypertension.

Very recently, the impact of side-selection on short-term adrenal function after living donation has been addressed in a prospective study using ACTH stimulation test at 1 month post-donation. This study suggests a transiently impaired adrenal function after left-sided nephrectomy that returns to baseline after 1 month. However, processes that impact adrenal function transiently as transection, scarring or anatomical adaptations cannot be excluded to impact adrenal function in long-term at least in a subgroup of donors. This needs to be addressed in upcoming studies.

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There are no relevant conflicts of interest to disclose.

