



Mental Representations of the New Organ and Posttransplant Patients' Anxiety as Related to Kidney Function

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ABSTRACT

Transplant patients' representations of their illness, body, and emotional state significantly influence their recovery. In this study, our primary aim was to examine the possible connections between emotional factors, body and illness representations, and renal function after 58 kidney transplantations. To measure mental representations of transplanted kidneys, we developed a projective drawing test. Other assessment instruments were the Beck Depression Inventory, Spielberger's State and Trait Anxiety Scale, and an in-house questionnaire. We also measured conventional kidney function markers, such as serum creatinine and urea levels. Analysis of our results revealed that patients with higher anxiety levels drew significantly larger kidneys in their projective drawing tests, and displayed significantly higher 10-day creatinine and urea level leading us to consider interrelations of an organ's intrapsychic integration and kidney function. If the graft is not integrated mentally in the body image, the representations of the "foreign body" can be associated with such psycho-neuro-immunologic processes of anxiety, which eventually may lead to adverse physiological effects on kidney function.

THERE IS INCREASING EVIDENCE suggesting that psychological factors are important determinants of the long-term success of kidney transplantation.¹⁻⁸ A wide range of interdisciplinary research demonstrates that transplant patients' attitudes and representations related to their illness, body, and healing processes significantly influence recovery.⁹⁻¹² It has been well known since early studies in this field that patients create different mental representations of their kidney immediately after organ implantation.¹³ These representations evoke various emotional reactions.¹⁴ The process of kidney integration is strongly influenced by the patient's psychological condition and fantasies about the organ,^{15,16} showing important influences of psychological factors on kidney transplant outcomes.

Our primary aim in this study was to examine the possible connections between posttransplant patients' emotional and mood factors, illnesses, body representations and kidney functions. Our secondary aim was to develop a quantifiable tool to measure mental representations of the newly transplanted organ and its integration into the body. We assumed that through an analysis of the patients' representations we would be able to specify links to emotional processes that might relate to possible somatic and psychological complications experienced during recovery. We hypothesised that these, problems were manifested in the way

that patients represented their bodies and their transplanted kidneys using our in-house designed projective drawing tests. The theoretical starting point to develop this technique was to make it indirect and nonverbal, thus allowing us to call forth and objectify the less conscious feelings and fantasies connected with the implanted kidney. As an improvement of the Machover Draw-a-Person Test, which has been previously applied to measure body images of kidney transplant patients,⁷ we completed the test with instructions to draw the newly received kidney as well. We hypothesized that the position of the kidney in the drawing (inside versus outside the body) and its size compared with the whole body may reflect the patient's fantasies about organ acceptance and related emotional stress. We as-

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sumed that drawings of patients with higher levels of anxiety or depression would show the organ different from those of emotionally more balanced patients. We further assumed circular causal connections between these variables and kidney functions.

PARTICIPANTS AND METHODS

Data were collected over a 2-year period from December 2009 to December 2011. The study included as a member of the renal team a psychologist who saw all posttransplant patients within the Transplantation Department treatment protocol. The study sample comprised 58 patients, who were mainly males ($n = 34$; 58.6%), and a mean overall age of subjects of 50.8 years (range = 28–69). **Twenty-four** (44.4%) recipients were males, with of mean age of 44.26 years (range = 23–75 years). Each patient was provided with comprehensive information regarding the study.

We tested each patient with a combination of five metrics: (1) measurements of creatinine and urea levels on days 5 and 10 after transplantation as part of our routine clinical blood tests; (2) Spielberger's State and Trait Anxiety Scale (STAIS; STAIT); (3) Beck's Depression Scale; (4) a projective test comprised of a drawing task of the patient's figure and the new organ; and (5) a in-house designed questionnaire, which consisted of nine items to assess the patients' illness representations and beliefs about the kidney's physical and psychological integration. Patients were interviewed individually between the postoperative days 5 and 10. In the projective drawing test using a set of 12 colored pencils, patients received instructions to first draw their own body on an A4-sized blank sheet, then, the newly received kidney. No further instructions were given about the position, size, color, or other details of the drawings.

We calculated a quantitative indicator from the size of the kidney, and its ratio to the size of the body in the drawings. Statistical analysis was performed using SPSS, version 17.0. Descriptive data were reported as frequency distributions. Pearson correlation coefficient and independent sample Student t test were used for normally distributed variables. All tests were two-tailed; a P value of .05 was considered statistically significant.

RESULTS

Depression and Anxiety After Transplantation

The measured level of depression and anxiety after transplantation fell within normal ranges. There was no significant difference between the sexes. Average state anxiety level of men (STAIS: 40.23, $n = 34$; standard deviation [SD] = 10.96), and women (STAIS: 37.08, $n = 24$, SD = 7.79) were similar. On the trait anxiety scale, the male patients' mean score was 39.23 ($n = 34$, SD = 10.38), while for the women it was 38.62 ($n = 24$, SD = 10.03). Results of the Beck Depression Inventory were also in the normal zone: the mean score of women was 3.7 ($n = 24$, SD = 1.68), and for men, 4.2 ($n = 34$, SD = 3.9).

Emotional State and Illness Representations as Reflected in the Projective Drawing Test

We observed relationships between emotional factors and kidney size in the projective drawing tests. Patients with higher anxiety levels drew significantly larger kidneys ≥ 2.245 cm/(STAIS $P = .041$, $df = 56$, $t = 2.09$; STAIT

$P = .042$, $df = 56$, $t = 2.0825$; Fig 1 and Fig 2.) Patients who drew larger kidneys (≥ 2.245 cm) agreed significantly more strongly with the following statement in our questionnaire: "I think I have no influence on the healing process" ($P = .00$, $df = 56$, $t = 2.74$).

Mood and Emotional Factors and the Beliefs About Recovery

Patients with higher trait and state anxiety levels agreed significantly more often with the questionnaire items "I think I have no influence on the healing process" (STAIS $P = .03$, $df = 56$, $t = 2.11$; STAIT $P = .05$, $df = 56$, $t = 1.96$), and "My recovery depends on the interventions of doctors and on medications" (STAIS $P = .02$, $df = 56$, $t = 2.3$; STAIT $P = .01$, $df = 56$, $t = 2.63$).

Patients with lower actual (state, STAIS) and dispositional (trait, STAIT) anxiety levels tended to show significantly greater agreement with the statement "I think my illness does not affect particularly my work and studies" (STAIS $P = .07$, $df = 58$, $t = -1.87$; STAIT $P = .047$, $df = 56$, $t = -2.1$).

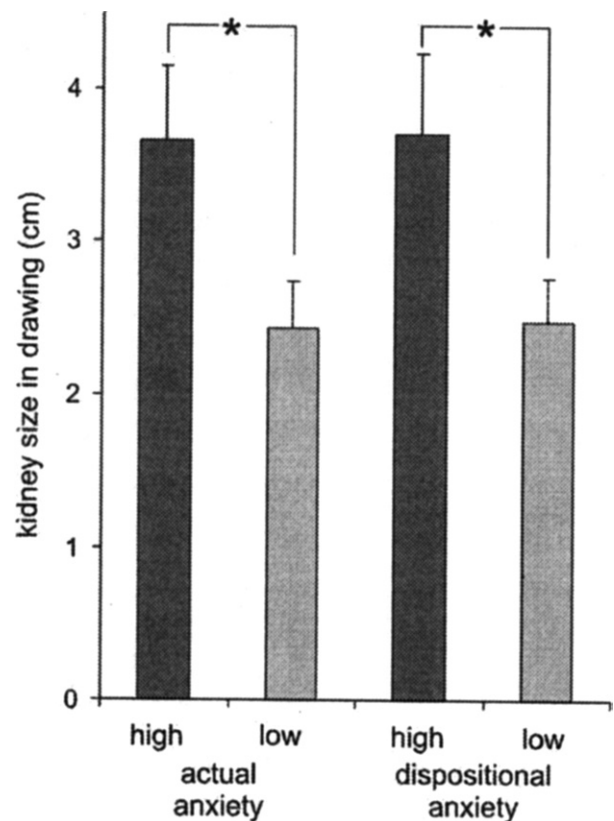


Fig 1. State (actual) and trait (dispositional) anxiety levels, and the kidney's size in the projective drawing test ($P < .05$, data are presented as means \pm standard error of the mean).

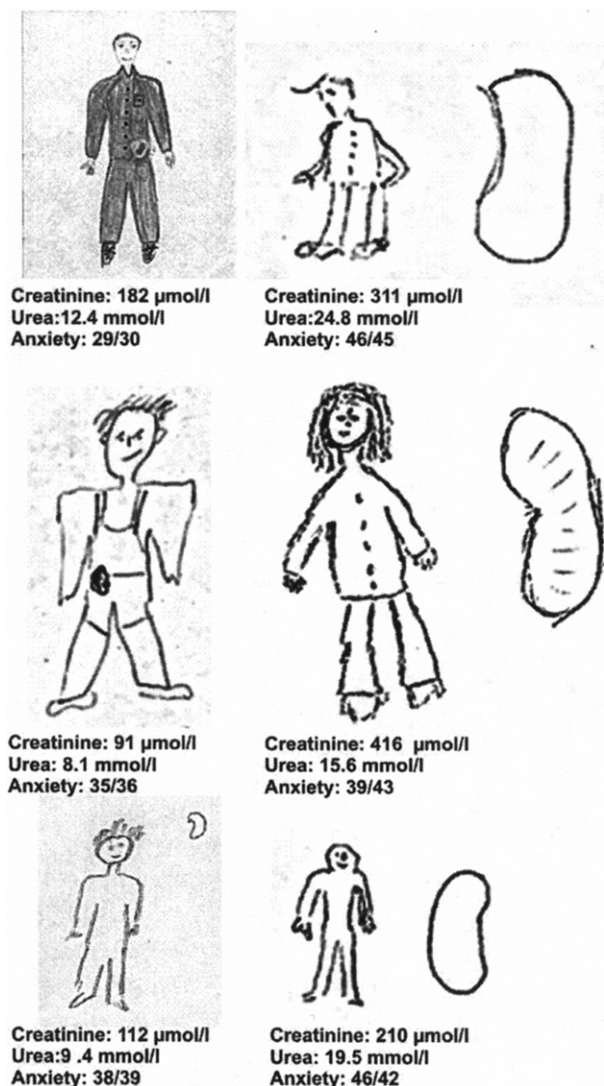


Fig 2. Body and organ drawings, patients' day 10 serum creatinine and urea level, and actual (state) and dispositional (trait) anxiety levels.

Renal Functions and Psychological Factors

Serum creatinine ($P = .01$, $df = 56$, $t = 2.52$) and urea levels ($P = .02$, $df = 56$, $t = 2.28$) on day 10 after transplantation were significantly higher among those who drew larger kidneys in the projective test (≥ 2.45 ; Table 1, Fig 2, Fig 3). The day 10 blood test showed lower creatinine and urea

Table 1. Kidney Size in Drawing Test and Renal Function

Day 10 Laboratory Parameters	Small Kidney Size in Drawings (size <2.45 cm, $n = 28$)	Large Kidney Size in Drawings (size ≥ 2.45 cm, $n = 30$)
Serum creatinine ($\mu\text{mol/L}$)	199.67 \pm 124.6*	319.0 \pm 218.7*
Serum urea (mmol/L)	15.72 \pm 8.28	20.86 \pm 8.77

Data are presented as means \pm standard deviations. * $P < .05$.

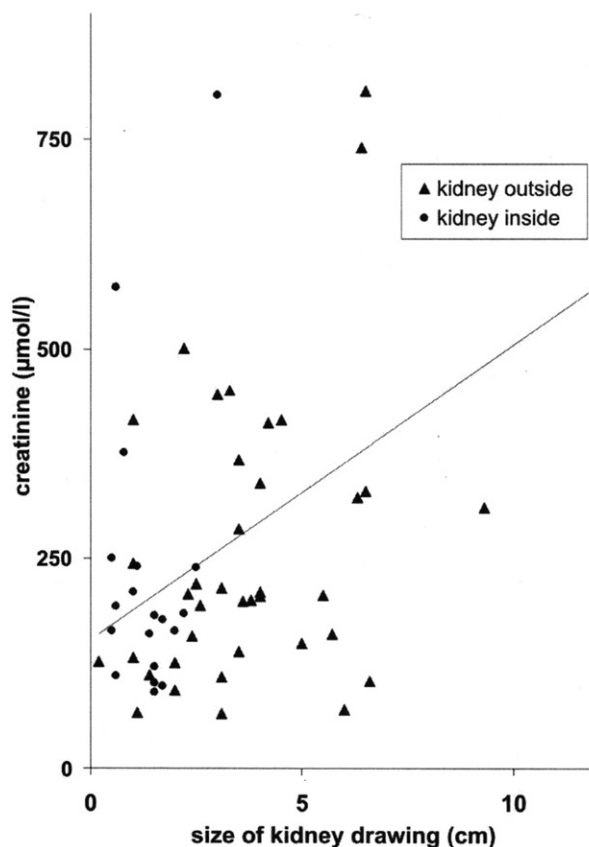


Fig 3. Correlation of kidney size in the drawing test with day 10 serum creatinine level. The line indicates the linear regression between the variables ($r = .46$, $P < .001$, $n = 58$). Kidney drawings outside and inside the body are also indicated.

levels among subjects who drew their kidney smaller, suggesting normal functioning of the transplanted organ. There was a marginally significant tendency toward an improved creatinine level from day 5 to 10 among those who drew the kidney outside versus inside the contours of the body ($195.1 \pm 209.6 \mu\text{mol/L}$ and $103.1 \pm 162.5 \mu\text{mol/L}$ outside and inside, respectively mean \pm SD, $P = .07$).

We also noted strong correlations between creatinine and urea levels and some illness beliefs. Patients who agreed with the statement "You can substantially influence your health status by a proper lifestyle, diet, and right attitudes" showed significantly lower creatinine ($P = .00$, $r = -.5$, $n = 58$) and urea levels ($P = .039$, $r = -.27$, $n = 58$) on the day 10 blood test.

DISCUSSION

Based on the results obtained with our new tool, the projective drawing test, we observed that patients with a higher actual (state) and dispositional (trait) anxiety drew implanted kidneys significantly larger and with a tendency to place it outside the contours of the body. These features were manifestations of mental representations of a body

under anxiety, which possibly entailed an obstacle for normal intrapsychic integration of the organ. In psychosomatic terms, it meant that anxiety magnified the mental image of the new organ, not letting the body receive it. The body's boundaries serve as a defence against a "foreign body," which acts as a source of anxiety.¹⁷ The inability of the body to integrate the new organ on the somatic level was manifested in disturbances of kidney functions as measured by serum creatinine and urea levels.

Our in-house questionnaire examined patients' attitudes and views about their disease and health in general. Patients with greater anxiety felt that their successful recovery was firstly dependent on all of the medical personnel, grossly underestimating their own contribution. This was consistent with the general rule that hospitalized patients, especially those in serious conditions, assign more control to the hospital staff. However, together with the intensification of anxiety, these patients tend to rely excessively on the staff, thus handing over too much control. Consequently, they tend to lose their own coping resources, which substantially affects their recovery. This finding clearly indicated the importance of developing reliable tools to measure anxiety, a critical role to assess the need for psychological support pre- and posttransplantation.

Another interesting result was that patients with lower anxiety levels felt their disease did not particularly affect their work or their studies. This finding clearly indicated work and feelings of self-efficacy are important parts of our identity that can function as protective factors against anxiety. In our study patients with higher levels of anxiety felt that nobody understood them, and consequently they might feel lonely and isolated, which could increase anxiety. Here again we emphasize the important role of the psychologist, who can help to recognize and alleviate these feelings in the setting of the hospital department.

One of our most important findings was the correlation between projective test results and renal function. Patients who drew the kidney smaller in the projective test showed lower urea and creatinine levels on the day 10 blood test. Since the size of kidney in the projective test correlated with anxiety levels, we thus concluded that kidney size may serve as an anxiety indicator. This observation may also suggest the usefulness of simple psychodiagnostic measures like our projective drawing technique for application not only to examine representations after transplantation, but possibly also to explore backgrounds of preoperative anxiety. We have found this tool especially adequate for seriously ill hospital patients since it is fast and independent of a patient's literacy skills, while the process of drawing itself has a relaxing effect.

Our data suggested that higher distress and negative mood states correlated with kidney dysfunction posttransplantation. We assume that there is a circular causal

connection between these factors, which may have a negative effect on the healing process through anxiety provoking mental representations, which in turn impede effective coping strategies. These results may serve as a basis to develop complex treatment interventions, which may help patients to cope with the biopsychosocial challenges of integrating a new organ into their body and self.

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