Personality, illness perceptions, and lung function (FEV$_1$) in 50 patients after lung transplantation

Persönlichkeit, subjektive Krankheitsvorstellungen und Lungenfunktion (FEV$_1$) bei 50 Patienten nach Lungentransplantation

Abstract

Objective: After lung transplantation little attention has been devoted to patient's personality and illness perceptions, although the importance of illness perceptions (e.g. to the psychosocial status of health) as well as the relationship between personality and illness perceptions is well-known from other areas of medicine.

Methods: Fifty patients more than one year after lung transplantation were surveyed by the NEO Five-Factor Inventory (NEO-FFI) as well as the "control" and "consequences" scales of the Illness Perception Questionnaire (IPQ). Medical data included the diagnoses of the underlying lung diseases and the pulmonary graft function as measured by the forced expiratory volume in one second (FEV$_1$).

Results: In our patients, mean values of the personality factors "extraversion" (p=.003), "openness to experiences" (p<.001), "agreeableness" (p=.035), and "conscientiousness" (p<.001) were significantly higher compared to the normal population. "Openness to experiences" correlated positively and "neuroticism" negatively with the illness perception "control". There was no correlation between illness perceptions and lung function.

Conclusion: In lung transplant recipients, personality traits are more relevant to illness perceptions ("control") than current graft function.

Keywords: lung transplantation, personality, illness perception, control, consequences, lung function

Zusammenfassung

Hintergrund: Persönlichkeit und subjektive Krankheitsvorstellungen bei Patienten nach einer Lungentransplantation fanden bisher kaum Beachtung, obwohl die Bedeutung subjektiver Krankheitsvorstellungen (z.B. hinsichtlich des psychosozialen Verlaufes einer Erkrankung) wie auch die Beziehung zwischen Persönlichkeit und subjektiven Krankheitsvorstellungen aus anderen Gebieten der Medizin wohl bekannt sind.

Methodik: 50 Patienten, bei denen vor mehr als einem Jahr eine Lungentransplantation durchgeführt worden war, wurden anhand des NEO-Fünf-Faktoren-Inventar (NEO-FFI) sowie der beiden Skalen "Krankheitskontrolle" und "Konsequenzen" des Illness Perception Questionnaire (IPQ) untersucht. Die medizinischen Daten umfassten die Diagnosen der zu Grunde liegenden Lungenenerkrankung und die aktuelle Lungenfunktion (FEV$_1$).

Ergebnisse: In unserer Stichprobe lagen die Mittelwerte der Persönlichkeitsfaktoren "Extraversion" (p=.003), "Offenheit für Erfahrungen" (p<.001), "Verträglichkeit" (p=.035) und "Gewissenhaftigkeit" (p<.001) signifikant höher als in einer Vergleichs-Stichprobe der Allgemeinbevölkerung. "Offenheit für Erfahrungen" korrelierte signifikant positiv, "Neurotizismus" negativ mit der subjektiven Krankheitsvorstellung "Kontrolle". Keine Korrelation bestand zwischen subjektiven Krankheitsvorstellungen und aktueller Lungenfunktion.
Schlussfolgerung: Nach einer Lungentransplantation sind Persönlichkeitsmerkmale für die Gestaltung subjektiver Krankheitsvorstellungen ("Kontrolle") bedeutsamer als die aktuelle Lungenfunktion.

Schlüsselwörter: Lungentransplantation, Persönlichkeit, subjektive Krankheitsvorstellungen, Kontrolle, Konsequenzen, Lungenfunktion

Introduction

A series of studies have demonstrated that quality of life and psychological health improve after lung transplantation [1], [2], [3]. However, patients may still face health strains due to pulmonary infections, side effects of immunosuppression, or allograft rejection. In many chronic diseases, such as chronic pain [4], and rheumatoid arthritis [5], patient's perception of illness may influence both the susceptibility to complaints and the psychosocial state of health [6]. Illness perceptions may also be influenced by the patient's personality traits [7], [8]. In contrast to kidney transplantation [9], illness perceptions have not been investigated in patients after lung transplantation. On the other hand, patients' personality is a well-known psychosocial factor in the transplantation process. There are some indications for a relationship between personality and an allograft rejection [10]. Personality traits may affect health behaviour, e.g. compliance. In this way, there could be a relationship between personality and surviving time after an organ transplantation [11]. We therefore studied 50 lung transplant recipients with regard to personality traits, illness perception and the current lung function (FEV₁). In our theoretical framework personality provides affective as well as cognitive styles; there may be an association between these individual styles and illness perceptions. Our hypotheses were, that there is a relationship between personality factors and illness perceptions, and that personality factors are more relevant to illness perceptions than the current health status (e.g. lung function).

The aims of the study were 1. to investigate personality factors in lung transplant recipients and to compare them with a representative sample of the general population, 2. to search for potential correlations between personality factors and illness perceptions, and 3. to investigate whether illness perceptions and the current lung function (FEV₁) were correlated.

Methods

Sample and procedure

Between 1992 and 2002 125 patients underwent lung transplantation at the University Hospital Zurich. The study inclusion criteria required that transplantation was performed at least one year before the assessment, and that the participants had sufficient knowledge of German. These criteria were fulfilled in 53 patients. Forty-five of the 125 patients had died, 18 patients were one year or less after transplantation, five had incomplete medical data and four were only French speaking. The study aims were explained to the patients during a patient teaching session. The study was approved by the local ethical committee according to the ethical guidelines of the Swiss Academy of Medical Sciences [12]. The questionnaire was sent by mail, informed consent was obtained. The physicians in the Lung Transplant Program were asked to fill out a medical questionnaire providing the medical data from a computerized database.

Instruments

The Patient's Questionnaire recorded general socio-demographic information i.e. age, gender, partnership status, children, employment. Additionally, the questionnaire contained the following standardized measuring instruments: The NEO Five-Factor Inventory (NEO-FFI) measures the five fundamental dimensions of personality: 1. "neuroticism" (annoyed, embarrassed, having unrealistic ideas and little control over needs); 2. "extraversion" (active, assertive, talkative, energetic, optimistic); 3. "openness to experience" (inquisitive, possessing independent judgment, interested, placing value on new experiences); 4. "agreeableness" (altruistic, sympathetic, understanding, benevolent, accommodating); and 5. "conscientiousness" (persevering, precise, dependable, determined, systematic) [13]. The German version [14] of the NEO Five-Factor Inventory (NEO-FFI) by Costa and McCrae [15] was used. This version contains 60 items recorded on a 5-point Likert scale. The Illness Perception Questionnaire (IPQ) records the five components of illness perception "consequences", "control", "cause", "identity", and "time-line" of an illness [16]. According to the self-regulation model of Leventhal, these perceptions reflect the cognitive response of a patient to an illness or its symptoms [17]. For the present study, the IPQ-scales "control" and "consequences" were investigated. The dimension "control" indicates patients' ideas about what they themselves or providers of medical care can do to bring about recovery or to exert influence on the course of illness. The dimension "consequences" reflects the short-term and long-term effects of the illness, e.g. the perceived physical, social, economic and emotional consequences of the illness [6]. Both scales are unidimensional. Because the state of health after lung transplantation is more relevant than the previous lung disease, only the IPQ-subscales "control" and "consequences" are suitable to record transplantation-related illness perceptions. This design regarding illness percep-
tions is usual, because most studies that investigated illness perceptions have been restricted on one or two dimensions, normally "perceived control" [18]. According to the importance of the current physical state of health, in the individual items the term "illness" was replaced by "state of health". Typical items of the "control" scale are: "There is a lot which I can do to control my symptoms"; "Recovery of my status of health is largely dependent on chance or fate"; "What I can do determines whether my status of health gets better or worse." Typical items of the "consequences" scale are: "My status of health has major consequences on my life"; "My status of health has to become easier to live with", or "My status of health has strongly affected the way others see me."

In the Medical Questionnaire the diagnosis of the underlying lung disease that led to the lung transplant and the current FEV₁ were recorded. FEV₁ is defined as the "forced expiratory volume in one second" in percent of the norm values of the general population. Spirometry was performed with a mass flow meter (66200 Autobox®, SensorMedics, Yorba Linda, CA). Criteria for acceptability, reproducibility, and predicted normal values were used according to the European Community of Coal and Steel (ECCS) [19].

Statistical analysis

The statistical evaluation was carried out with the SPSS 11.0 program. In the descriptive statistics the data were expressed as absolute numbers, percent, mean and SD. Comparisons between study sample and representative sample were conducted with t-tests, Cohen's d was calculated for effect size. The correlations between variables were calculated by Pearson Correlation.

Results

Demographic and medical data

Fifty of the 53 patients who were asked participated in this survey. The response rate was 94%. The sample comprised 23 women (46%) and 27 men (54%) with a mean age of 42.9 years (SD=13.6). Forty-one patients (82%) lived with a partner, 24 (48%) had one or more children. All patients lived in Switzerland. At the time of the survey, two patients (4%) were working full-time, three patients (6%) more than 50%-time, 15 patients (30%) less than 50%-time, 15 patients (30%) were undergoing training or working in the household; 15 (30%) patients were unable to work.

Forty-nine patients (98%) had undergone a bilateral lung transplant, and one patient (2%) had received a unilateral lung transplant. On average, the lung transplantation had been performed 4.2 years ago (SD=2.2 years, minimum 1.6, maximum 9.1). Lung transplantation had been performed for the following diagnoses: cystic fibrosis (N=15, 30%), COPD (N=11, 22%), pulmonary fibrosis (N=9, 18%), and pulmonary hypertension (N=8, 16%), as well as other lung diseases (N=7, 14%) such as lymphangioleiomyomatosis, post-viral bronchiolitis obliterans, hystiocyteosis X, and bronchiectasis.

The current mean FEV₁ was 93% (SD 24.9) predicted; the range was between 25% and 148%.

Personality factors and illness perceptions

Table 1 shows the mean values for the five personality factors (NEO-FFI) and the illness perceptions "control" and "consequences" (IPQ), additionally showing the NEO-FFI mean values of a representative sample [20].

Table 2 shows the correlations between the five personality factors (NEO-FFI), the illness perceptions "control" and "consequences" (IPQ), and lung function (FEV₁).

As Table 2 indicates, there is a significantly positive correlation between "control" and the personality factor "openness to experiences". In contrast, the correlation between "control" and "neuroticism" is significantly negative. There are, however, no significant correlations between "control" and the personality factors "conscientiousness" and "agreeableness". Moreover, there is no significant correlation between "consequences" and the personality factors as well as the current lung function (FEV₁).
Table 1: Mean values, Cronbach's alpha and standard deviations for the five personality factors and the illness perceptions "control" and "consequences" (n=50), additionally showing the NEO-FFI mean values of a representative sample (n=1908) of the general population [18]

| Variable            | M   | SD  | min | max  | M (representative sample (norm)) | Cronbach's alpha | t-value | p study sample vs. norm | effect (Cohen's d) |
|---------------------|-----|-----|-----|------|---------------------------------|-------------------|---------|------------------------|-------------------|
| neuroticism         | 1.52| .68 | .33 | 3.87 | 1.62                            | .85               | -.99    | .322                   | .15               |
| extraversion        | 2.41| .48 | .92 | 3.25 | 2.20                            | .80               | 3.09    | .003                   | .43               |
| openness to         | 2.37| .50 | .92 | 3.75 | 2.05                            | .71               | 4.65    | (0.001                 | .66               |
| experiences         |     |     |     |      |                                 |                   |         |                        |                   |
| agreeableness       | 2.66| .38 | 1.67| 3.33 | 2.54                            | .71               | 2.17    | .035                   | .28               |
| conscientiousness   | 2.92| .41 | 1.67| 3.67 | 2.71                            | .85               | 3.65    | (0.001                 | .43               |
| control of illness  | 23.60| 4.32| 11.0| 32.0 | -2                              | .72               | -       | -                      | -                 |
| consequences of     | 21.60| 4.18| 10.0| 31.0 | -2                              | .82               | -       | -                      | -                 |
| illness             |     |     |     |      |                                 |                   |         |                        |                   |

1 Mean values and internal consistency of the NEO-FFI regarding a representative sample (n=1908) of the general German population (18).
2 The mean values in our sample lie in a similar range to those of clinical comparison studies (14); because of the adapted version of the IPQ, a direct comparison of the samples may be of little significance.
3 Internal consistency (Cronbach's alpha) in the original version of the IPQ (14).

Table 2: Correlations (r) between the five personality factors, FEV₁, and the illness perceptions "control" and "consequences" (n=50)

| Variables           | FEV₁ | control | consequences |
|---------------------|------|---------|--------------|
| neuroticism         | .06  | -.36*   | -.22         |
| extraversion        | .19  | .17     | .14          |
| openness to         | .16  | .29*    | .21          |
| experiences         | -.13 | -.09    | .12          |
| agreeableness       | -.07 | -.01    | .08          |
| conscientiousness   |      |         |              |
| FEV₁                |      | .06     | .06          |
| control             | .06  |         | .56**        |

* p<0.05, ** p<0.001

Discussion

To our knowledge, the present study is the first to record personality traits and illness perceptions concerning lung transplant recipients, and to investigate the relationship between personality as well as somatic features and illness perceptions. The results show the largely ignored importance of personality factors and illness perceptions in transplantation medicine. Due to the high participation rate of 94%, selection effects are almost non-existent. The limitation of the study, however, lies in the cross-sectional design of the investigation and the adaption of the Illness perception Questionnaire IPQ (changing the term "illness" to "health status"). In addition, the mean values of lung function (FEV₁ in percent predicted) of our patient group are favourable. Nevertheless the range of values is wide, and a substantial number of patients had pathologic lung function values.

The first interesting result of our study is, that lung transplantation recipients show significantly higher mean values of the personality factors "extraversion", "openness to experiences", "agreeableness", and "conscientiousness" compared to a representative sample of the general population (20). In contrast to "neuroticism", these personality factors are more connected with social and personal skills.

To our knowledge, there are no data with regard to the five personality factors before a lung or other organ transplantation. Because of the current state of research we are not able to say, if the NEO-FFI values of transplantation candidates differ from the normal population. An explanation for this result could be that there is a kind of involuntary selection of lung transplantation candidates regarding their personality. In general, lung transplantation candidates show a lower incidence of psychiatric disorders in comparison to other transplantation candi-
dates [21]. In our opinion, a possible selection could take place during the pre-transplant evaluation or in connection with the referring doctor’s first decision to recommend transplantation. Additionally, there could be local selection criteria, regarding transplantation candidates that differ from center to center. In this sense, lung transplantation patients might be an especially selected patient group that show higher values of socially well accepted personality factors.

An alternative explanation of this result, however, could be that there is a certain change of personality under the longstanding impression of the transplantation experiences. Despite the normally stable trait quality of personality factors, there is some evidence, that a personality change following strong psychological stress situations may occur [22]. A broad literature shows that positive personal and psychological changes are possible in connection with traumatic stress situations like severe diseases [23]. The significantly higher values of "extraversion", "openness to experiences", "agreeableness", and "conscientiousness", but not of "neuroticism" may indicate such a "personal growth" after lung transplantation. These explanations, however, could be proved only by a prospective study that investigates the personality before and after transplantation in different transplantation centers.

The mean values for the illness perceptions "control" and "consequences" represent a similar range compared to clinical comparison studies [14]. Since we are dealing with an adapted version of the two IPQ subscales (replacing the term "illness" by "state of health"), a direct comparison of the samples is of limited significance. However, there is a significant positive correlation between the perception "control" and "openness to experience" as well as a significant negative correlation between "control" and "neuroticism": Patients who value new experiences ("openness to experiences") tend to trust in the controllability of their state of physical health. On the other hand, patients who express aggressive feelings or unrealistic notions ("neuroticism"), are more likely to develop the idea that their state of health could not be controlled (by themselves or the medical staff). Thus, whether a patient believes that her or his current state of health is controllable may be far less in connection with the current lung function than with personality features.

**Conclusions**

Because of the significantly negative correlation between "control" and "neuroticism", clinical consequences of the study results may be that patients with high values of neuroticism - because of their feeling of uncertainty - require more intensive medical and psychosocial care. In contrast, the personality factor "openness to experiences" could be understood as an individual resource for lung transplant recipients. In any case, this result indicates that certain patients can still feel uncertain even though their physical health is stable.

In our opinion, the differentiated, standardized assessment of personality aspects and illness perceptions after lung transplantation is an important psychosocial research area for the future. Illness perceptions may influence both the proneness to complaints and the psychosocial well-being after transplantation; and they also may have an effect on health behavior [8]. Personality tests could be used to assess the predictive values of individual personality factors (as a personal resource or risk factor) for the psychosocial outcome after lung transplantation. These results could contribute to early identification of patients with psychosocial risks, and to the introduction of appropriate psychosocial treatment.

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